

JOURNAL
OF THE
American Veterinary Medical Association
FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

H. Preston Hoskins, Secretary-Editor, 537 Book Building, Detroit, Mich.

MAURICE C. HALL, President, Washington, D. C. M. JACOB, Treasurer, Knoxville, Tenn.

Executive Board

R. S. MacKELLAR, Member-at-Large and Chairman;

T. H. FERGUSON, ex officio; MAURICE C. HALL, ex officio;

GEO. HILTON, 1st District; E. P. ALTHOUSE, 2nd District; L. A. MERILLAT, 3rd District;

C. A. CARY, 4th District; C. P. FITCH, 5th District; GEO. H. HART, 6th District;

C. H. HAYS, 7th District; N. F. WILLIAMS, 8th District; D. H. UDALL, 9th District;

O. V. BRUMLEY, 10th District.

The American Veterinary Medical Association is not responsible for views or statements published in the JOURNAL, outside of its own authorized actions.

Reprints should be ordered in advance. Prices will be sent upon application.

Vol. LXXIX, N. S. Vol. 32

August, 1931

No. 2

ON TO KANSAS CITY

By the time this issue of the JOURNAL reaches our members the plans for the Kansas City convention will be practically complete. Only those who have served as members of a local committee on arrangements can appreciate the multiplicity of details that enter into the successful planning of an A. V. M. A. convention. Being a center of veterinary activities, Kansas City has plenty of man power to put into play for an occasion of this kind, which is indeed fortunate. After all, it is the men behind the guns who make our conventions the big events that they have grown to be.

Under normal conditions we would look forward to a record-breaking attendance this year. But we all know that conditions have not been normal the past year and veterinarians, particularly those engaged in practice, both city and country, have felt the effects of reduced incomes. It would be foolish to expect that the attendance figures at Kansas City would not be affected, to some degree, as a result of economic conditions.

On the other hand, there are a number of factors that should help to boost the attendance. When Kansas City and August are mentioned in the same breath, there may be visions of a thermometer with the mercury up around the century mark. However,

we have been assured by Dr. Ashe Lockhart, who has been looking after the hotel situation, that the Pompeian Room at the Baltimore Hotel, where all general sessions will be held, as well as the sessions of the Section on General Practice, will be cooled to a temperature *not to exceed 75 degrees Fahrenheit*, no matter how hot it may be outside. In other words, the weather question has been settled.

The railroads have granted reduced fares to Kansas City on the certificate plan. A few years ago it was necessary to secure 250 certificates for the plan to go through. With the increased competition, in the form of automobile and bus transportation, the railroads have seen fit to reduce the number, so that now it is necessary to secure only 150 certificates to get the half-fare returning. (See announcement on page 146.)

Every member has received a letter from the management of the Baltimore Hotel, quoting the rates that will be in effect during the week of the convention. These rates appear to be very reasonable, especially when compared with the rates that we have been charged in several other cities in which we have met. So we have reduced fares and reasonable hotel rates in our favor, both of which directly help the pocket-book and should undoubtedly boost the attendance.

The greatest urge to go to Kansas City this month is the program. More than fifty papers are listed for presentation and discussion before the five sections and the general session Thursday evening. These papers, many of them illustrated, will give the very latest information in all fields of veterinary medicine. Closely identified with the literary program is the clinic, scheduled for Friday. Dr. S. L. Stewart has worked untiringly for the past six months, developing plans for the clinic, and several features have been booked that will be absolutely new, as far as A. V. M. A. clinics are concerned.

The registration will be in charge of Dr. E. R. Steel, who will have everything in readiness to start registering the early arrivals on Monday morning, August 24. The entertainment of the ladies has been entrusted to Dr. J. C. Flynn, who has been making an intensive study of bridge teas, theatre parties and sight-seeing tours during the past year. Transportation problems will be solved by Dr. G. G. Graham, and Dr. C. M. McFarland will help you park your car, if you drive to Kansas City. Publicity for the convention is being directed by Dr. C. D. Folse, and Dr. H. E. Curry is watching the financial end of things very carefully.

Those who will arrange for their respective alumni meetings Tuesday evening should see Dr. J. D. Thrower as early in the day as possible. Dr. F. H. Suits will be master of ceremonies at the reception, Tuesday evening, following the alumni meetings, and Dr. J. L. Jones will be in charge of the banquet, Wednesday evening. Captain J. A. McCallam has been placed in command of Army affairs, and Dr. J. S. Jenison will supervise B. A. I. activities during the week. Dr. F. A. Imler will see to it that nobody goes hungry at lunch time during the clinic on Friday. Coördinating all these various activities we find Dr. A. T. Kinsley, who probably would not have to be introduced to more than a dozen veterinarians in the entire country. We may be putting the number too high when we say a dozen.

We'll be seeing you in "The Heart of America," August 25-26-27-28.

SUCCESSFUL CANDIDATES



DR. L. M. HURT
Los Angeles, Calif.
District 6



DR. N. F. WILLIAMS
Fort Worth, Texas
District 8

Elected members of the Executive Board for five-year terms, beginning at the close of the Kansas City meeting. Dr. Hurt will represent District 6, succeeding Dr. George H. Hart. Dr. Williams will represent District 8, succeeding himself.

RECOGNITION OF A PRINCIPLE

Considerable publicity has been given by the newspapers to a statement attributed to the secretary of an organization having headquarters in a western city to the effect that officials of the U. S. Department of Agriculture should be held responsible for the damage done by allowing the distribution, sale and use of adulterated Jamaica ginger. "Jake" paralysis is the term that has commonly been employed to designate the condition of those suffering from the effects of imbibing too freely of the illicit beverage.

Perhaps unconsciously, these poor people, unfortunate victims of their own folly, have recognized the right of a government to exercise certain police powers where the general welfare of the people may be jeopardized. We recall numerous instances where this general principle of police power has been questioned by individuals and even organizations. In many cases legal talent has been engaged to thwart officials and official agencies in the exercise of their duties, these being definitely prescribed by law.

Examples of such interference have been seen all too frequently during recent years in connection with tuberculosis eradication. Misguided owners of tuberculous cattle, in certain cases, have questioned the right of the duly constituted officials to stop them from selling or distributing milk from diseased cows. Others have opposed quarantines because they did not recognize the right of the duly authorized officials to impose such restrictions. Other examples could be cited.

It is said that every cloud has a silver lining and in this particular case we may get some satisfaction from knowing that the sufferers from "jake" paralysis recognize the principle embodied in practically all regulatory legislation designed for the protection of both human beings and animals against disease, impure or unwholesome food, worthless, contaminated or otherwise dangerous biological products, as well as impure, inert or improperly labeled drugs. Too often there is a tendency to deny this right, either through sheer ignorance or just plain meanness.

It should be added here that Mr. W. G. Campbell, Director of Regulatory Work of the U. S. Department of Agriculture, has replied to the criticism directed against the Food and Drug Administration, pointing out that the Jamaica ginger in question frequently was shipped in barrels labeled "Liquid Medicine," was bottled by the consignees and distributed locally. According

to Mr. Campbell, this procedure involved no infraction of the federal law. Prompt action was always taken whenever possible. Goods were seized whenever offenses were uncovered and shippers were prosecuted whenever evidence was obtained against them, Mr. Campbell pointed out. At the same time he expressed his resentment at the loose accusations made by persons who know neither the law nor what constitutes evidence.

CONGRATULATIONS, INDIANA!

On July 1, the U. S. Department of Agriculture officially designated the entire state of Indiana as a modified accredited area, as a result of bovine tuberculosis having been reduced to one-half of one per cent or less. The Hoosier State is the fourth to be added to the honor roll of states practically free from bovine tuberculosis. North Carolina was the first, Maine the second and about a year ago Michigan was added to the list. For the first time we now have two adjacent states as modified accredited areas.

Two veterinarians stand out very conspicuously in this achievement, namely, Dr. Frank H. Brown, state veterinarian of Indiana, and Dr. J. E. Gibson, U. S. B. A. I. Inspector-in-Charge of tuberculosis eradication in Indiana. These men had the loyal support of their field veterinarians, as well as excellent cooperation from owners of cattle, and the state and county officials. Without this splendid teamwork, as well as timely assistance granted by the Indiana Legislature, on several occasions, it would not have been possible to bring this campaign to a successful conclusion, at this time. It was necessary to apply the tuberculin test to approximately 3,000,000 cattle, and of this number about one per cent reacted to the test. This involved the disposition of some 30,000 reactors.

Congratulations, Indiana! What state will be next?

FUTURE CONVENTIONS

An unusual amount of interest is being displayed in future conventions of the American Veterinary Medical Association. At the meeting in Los Angeles, one year ago, New York and Havana, Cuba, extended invitations for 1932. In all probability these invitations will be renewed at Kansas City, this month. It is definitely known that at least two other cities, and possibly more, will invite the Association for 1932. Atlanta, Georgia, and Memphis, Tennessee, have thrown their respective hats in

the ring. On account of the fact that the Olympic Games will be held in Los Angeles, in 1932, it has been suggested that it might be well for us to return to the California city again, next year.

Chicago will put in a bid for the 1933 meeting, in view of the fact that the World's Fair will be held in the Windy City, that year. Canada will be in the field with an invitation to meet in Winnipeg, Manitoba, in 1933. The members located in Toronto have also been seriously considering the advisability of asking for a convention in the near future.

It is generally understood that the 1934 meeting will be held wherever it is finally decided to hold the 1934 International Veterinary Congress. There are reasons why this great event should be held in the East. With the 1931 meeting in Kansas City, it is logical to believe that the 1932 convention will go to some eastern city, with a swing back to the central part of the country in 1933, and the 1934 meeting in eastern territory for the reason given.

REDUCED FARES TO KANSAS CITY

Reduced fares, applicable only to members of the A. V. M. A. or dependent members of their families, on the basis of one and one-half fare on the certificate plan, have been granted by the several passenger associations throughout the United States. Depending on the distance from Kansas City, going tickets may be purchased between August 17 and August 27. When the ticket is purchased, be sure and ask the ticket agent for a *certificate*. If it is impossible to get a certificate from the local ticket agent, a *receipt* for the fare paid will be satisfactory and should be secured when the ticket is purchased. Be sure and see that the ticket reads to *Kansas City, Missouri*. See that your certificate is stamped with the same date as your ticket. *Sign your name* to the certificate or receipt, in ink, in the presence of the ticket agent. Allow an extra thirty minutes before the departure of the train, for securing your ticket and certificate. Immediately upon arrival at Kansas City, turn in your certificate at the registration desk at the Hotel Baltimore.

You will pay the full regular one-way fare to Kansas City. The reduced fare for the return journey will not apply unless the required number of certificates is presented and validated at the convention. No refund of fare will be made on account of your failure to obtain either a proper certificate or to have the same

validated. In order to avail yourself of the reduced fare returning, it will be necessary for you to return home *via* the same route as the going journey. The certificate will entitle the holder to the reduced fare returning, provided the ticket is purchased not later than September 1. Even though you may intend to return home by some other route, and do not expect to be able to use your certificate, ask for one just the same. *Certificates will count even if the holders do not use them.*

Understand that the reduced fares are not guaranteed but are contingent on our ability to secure 150 certificates at the convention. The agent representing the railroads at Kansas City will not start validating the certificates until the minimum number required has been turned in. We repeat: *Get a certificate when you purchase your ticket for Kansas City and turn it in as soon as you arrive at the Hotel Baltimore.*

HOTEL RATES IN KANSAS CITY

HOTEL	LOCATION	RATES	
		SINGLE WITH BATH	DOUBLE WITH BATH
Baltimore (Official headquarters)	12th & Baltimore	\$2.50—\$8.00	\$4.00—\$12.00
Aladdin	12th & Wyandotte	2.50— 4.00	3.50— 6.00
Coates House	10th & Broadway	1.50— 3.50	2.50— 5.50
Dixon	12th & Baltimore	2.50— 3.50	2.50— 5.50
Muehlebach	12th & Baltimore	3.50— 9.00	5.00— 12.00
Phillips	12th & Baltimore	2.50— 4.00	4.00— 7.00
President	14th & Baltimore	2.50— 5.00	4.00— 7.00
Stats	12th & Wyandotte	2.00— 3.50	3.50— 7.50

ALPHA PSI CONVENTION

There will be a national convention of the Alpha Psi Fraternity at Kansas City, following the close of the A. V. M. A. convention. Members of the National Council, as well as delegates from the active chapters, will be in attendance, and all active, graduate and honorary members are invited to attend. The convention will be held at the Hotel Baltimore, Friday evening, August 28, at 8 o'clock. The principal business will consist of hearing reports from the active chapters and electing national officers for the ensuing biennium.

Be sure and have your 1931 A. V. M. A. membership card with you at Kansas City.

OUTLINE OF PROGRAM

(Subject to change)

MONDAY, AUGUST 24, 1931

- MORNING....Committee meetings.
AFTERNOON...Meeting of Executive Board.
EVENING....Conference of accredited delegates from state, provincial and territorial veterinary associations.

TUESDAY, AUGUST 25, 1931

- MORNING....Registration. Opening session, 10 a. m., *Pompeiiian Room*. Addresses of welcome. Response. President's address. Ladies attend.
AFTERNOON...General session, 2 p. m., *Pompeiiian Room*. Reports of Executive Board, committees and officers. Nominations of officers. Ladies attend theatre party.
EVENING....Meetings of college alumni groups, 6 p. m. President's reception and dance, 9 p. m.

WEDNESDAY, AUGUST 26, 1931

- MORNING....Sections meet, 9 a. m. Papers. Election, 9 a. m. to 6 p. m. Auxiliary breakfast for ladies, 9 a. m.
AFTERNOON...General session, 2 p. m., *Pompeiiian Room*. Reports of Executive Board and committees. Ladies attend fashion show, 4 p. m.
EVENING....Banquet, 7 p. m.

THURSDAY, AUGUST 27, 1931

- MORNING....Sections meet, 9 a. m. Papers. Army officers meet, 9 a. m. Ladies go on shopping tour, 10 a. m.; luncheon, 1 p. m.
AFTERNOON...General session, 2 p. m., *Pompeiiian Room*. Reports of Executive Board and committees. New business. Missouri Veterinary Medical Association meets.
EVENING....General session, *Pompeiiian Room*. Papers. Installation of officers.

FRIDAY, AUGUST 28, 1931

- MORNING....Clinic, 9 a. m. Ladies take sight-seeing trip; bathing at Playmor Pool; visit Coca Cola plant. Luncheon at 1 p. m.
AFTERNOON...Clinic continued.
EVENING....Alpha Psi convention.

PAPERS

SECTION OF GENERAL PRACTICE

First Session

Wednesday morning, August 26, 9 o'clock

1. Bang's Disease (Contagious Abortion) in Cattle and Its Relation to Undulant Fever in Man—Dr. Charles H. Kitselman, Kansas State College, Manhattan, Kans.
2. Spontaneous Infection with *Brucella Abortus* in the Bull—Drs. F. B. Hadley and E. B. Osborn, University of Wisconsin, Madison, Wis. Discussion by Drs. W. L. Boyd, Saint Paul, Minn., and A. T. Kinsley, Kansas City, Mo.
3. Clinical Studies on Retained Placenta in Cows (Illustrated)—Dr. C. C. Palmer, University of Delaware, Newark, Del. Discussion by Dr. E. R. Frank, Manhattan, Kans.



DR. J. H. SPENCE
Chairman, Section
on General Practice



DR. S. L. STEWART
Secretary, Section
on General Practice

4. Nutritional Deficiency in Its Various Forms—Dr. A. F. Schalk, Ohio State University, Columbus, Ohio.
5. The Value of Iodin in Cattle Practice—Dr. E. C. McCulloch, University of Wisconsin, Madison, Wis.

Second Session

Thursday morning, August 27, 9 o'clock

6. Post-Vaccination Troubles in Swine—Dr. Henry Hell, Wilton Junction, Iowa. Discussion by Drs. Dan W. Hurst, Tecumseh, Nebr., Robert Jay, Sacramento, Calif., and C. E. Salsbery, Kansas City, Mo.

7. Sheep Diseases and Experimental Studies—Dr. Henry W. Turner, Pennsylvania Bureau of Animal Industry, Harrisburg, Pa.
8. Care of the Ewe Before and After the Lambing Period—Dr. L. A. Hammers, Clearwater, Kans. Discussion by Dr. I. E. Newsom, Fort Collins, Colo.
9. County-Wide Eradication of Equine Parasites—Dr. John B. Bryant, Mount Vernon, Iowa. Discussion by Drs. F. H. Kelley, Goldfield, Iowa, and L. A. Merillat, Chicago, Ill.

SECTION ON SANITARY SCIENCE AND FOOD HYGIENE

First Session

Wednesday morning, August 26, 9 o'clock

10. Hog-Lot Sanitation and Its Relation to Swine Disease Control—Dr. H. A. Wilson, State Veterinarian, Jefferson City, Mo.
11. Tick Eradication—Dr. Joe H. Bux, State Veterinarian, Little Rock, Ark.



DR. W. H. LYTLE

Secretary, Section on Sanitary
Science and Food Hygiene

12. Anthrax—Dr. N. F. Williams, State Veterinarian, Fort Worth, Texas.
13. Problems of Tuberculosis Control and Its Relation to Sanitary Science and Food Hygiene—Dr. Peter Malcolm, State Veterinarian, Des Moines, Iowa.

14. Sheep Diseases—Dr. Hadleigh Marsh, Montana Veterinary Research Laboratory, Bozeman, Mont.

Second Session

Thursday morning, August 27, 9 o'clock

15. The Epizootological Study of Shipping Fever of Cattle in Kansas—Dr. J. P. Scott, Kansas State College, Manhattan, Kans.
16. Experiences in Eradicating Bang's Disease in Two Infected Herds—Dr. C. F. Clark, Michigan State College, East Lansing, Mich.
17. Bang's Disease in Unbred Heifers—Drs. C. F. Clark, Michigan State College, and D. B. Meyer, U. S. Bureau of Animal Industry, East Lansing, Mich.
18. The Control of Bang's Disease in Range Animals—Dr. A. M. McCapes, University of Missouri, Columbia, Mo.



DR. E. T. HALLMAN
Chairman, Section
on Research



DR. W. A. HAGAN
Secretary, Section
on Research

SECTION ON RESEARCH

First Session

Wednesday morning, August 26, 9 o'clock

19. Some Bipolar Organisms Found in Pneumonia in Sheep—Drs. I. E. Newsom and Floyd Cross, Colorado Agricultural Experiment Station, Fort Collins, Colo.

20. Report of Further Work on the Relation of *Bacterium Abortus* Bang to Fistula and Poll Evil of Horses—Dr. C. P. Fitch and Lucille Bishop, University of Minnesota, Saint Paul, Minn.
21. Blackleg Immunization—Dr. J. P. Scott, Kansas State College, Manhattan, Kans.
22. Studies on Canine Distemper. I. The Bacteriology of One Hundred Naturally Infected Cases—Dr. A. S. Schlingman, Research Laboratories, Parke, Davis & Company, Detroit, Mich.
23. Histological Studies on Hog Cholera—Drs. C. B. Cain and O. Seifried, Department of Animal Pathology, Rockefeller Institute for Medical Research, Princeton, N. J.
24. A Study of Hog Cholera Serum and Virus for the Presence of Brucella—Drs. H. W. Johnson and I. Forest Huddleson, Michigan State College, East Lansing, Mich.
25. Salmon Poisoning: Transmission and Immunization Studies—Drs. B. T. Simms, A. M. McCapes and O. H. Muth, Oregon Agricultural Experiment Station, Corvallis, Ore.
26. Preliminary Bacteriological Report on Shipping Fever—Drs. J. P. Scott and H. Farley, Kansas State College, Manhattan, Kans.
27. The Resistance of the Bacillus of Johne's Disease to Lytic Influences—Dr. W. A. Hagan and Eveleen Rexford, New York State Veterinary College, Ithaca, N. Y.

SECTION ON POULTRY

First Session

Wednesday morning, August 26, 9 o'clock

28. The Hatchability of Eggs and the Livability of Chicks of Pullorum-Infected and Non-Infected Hens—Dr. H. C. H. Kernkamp, University of Minnesota, Saint Paul, Minn.
29. Tuberculosis of Turkeys, with Special Reference to Tuberculin Testing (Illustrated)—Dr. W. R. Hinshaw, University of California, Davis, Calif., Dr. K. W. Niemann, University of Nevada, Reno, Nevada, and Dr. W. H. Busic, Chico, Calif.
30. Observations on Prolapse or So-called "Blow Out" in Chickens—Dr. H. J. Stafseth, Michigan State College, East Lansing, Mich.

31. Recent Developments in Fowl Helminthiasis (Illustrated)
—Dr. James E. Ackert, Kansas State College, Manhattan,
Kans.
32. Studies of Leukemia of Fowls (Illustrated)—Dr. R. Fenster-
macher, University of Minnesota, Saint Paul, Minn.
33. Pasty Eyes in Ducklings—Dr. H. J. Stafseth, Michigan
State College, East Lansing, Mich.



DR. E. L. BRUNETT
Chairman, Section on Poultry



DR. FRANK THORP, JR.
Secretary, Section on Poultry

SECTION ON RESEARCH AND SECTION ON POULTRY

Joint Session

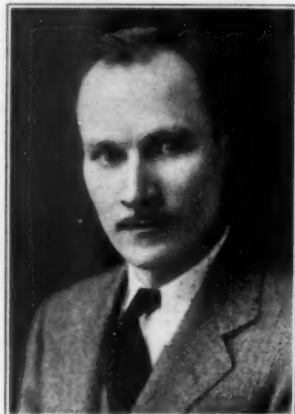
Thursday morning, August 27, 9 o'clock

34. The Relation of the Time Element to the Results Obtained
by the Rapid Agglutination Test for Bang's Disease—Dr.
C. R. Donham, University of Minnesota, Saint Paul,
Minn.
35. Comparative Germicidal Tests of Mercurochrome and
Tincture of Iodin—Maj. R. A. Kelser and Lt. R. W.
Mohri, Army Medical School, Washington, D. C.
36. Newer Knowledge on Encephalomyelitis in Horses—Drs.
K. F. Meyer, C. M. Haring and B. Howitt, George
Williams Hooper Foundation and Division of Veterinary
Science, College of Agriculture, University of California,
San Francisco and Berkeley, Calif.

37. A Modification of the Rapid Agglutination Test for Pullorum Disease—Dr. Howard Welch, Montana Agricultural Experiment Station, Bozeman, Mont.
38. Studies of Some Virus Diseases of Fowls—Drs. C. A. Brandly and L. D. Bushnell, Kansas State College, Manhattan, Kans.
39. Comparison of Three Methods of Testing for Pullorum Disease, with Finer Interpretations of Readings on the Old Tube Agglutination Test—Dr. A. J. Durant, University of Missouri, Columbia, Mo.
40. An Ataxia of Chicks Associated with a Nephritis—Dr. Glen L. Dunlap, Massachusetts State College, Amherst, Mass.



DR. F. F. PARKER
Chairman, Section on Small
Animals



DR. C. F. SCHLOTTHAUER
Secretary, Section on Small
Animals

SECTION ON SMALL ANIMALS

First Session

Wednesday morning, August 26, 9 o'clock

41. Non-Parasitic Skin Diseases of Dogs—Dr. E. C. Khuen, Chicago, Ill.
42. Treatment of the Diseases of the Eye and Accessory Organs—Dr. D. A. Eastman, Moline, Ill.
43. The Treatment of Fractures—Dr. E. B. Dibbell, Baltimore, Md.
44. Meningo-Cerebral Complications in Canine Distemper—Drs. Ashe Lockhart and S. B. Johnson, Ashe Lockhart, Inc., Kansas City, Mo.

Second Session

Thursday morning, August 27, 9 o'clock

45. Feeding Dogs—Dr. C. F. Schlotthauer, Mayo Foundation, Rochester, Minn.
46. Parasites and Parasitic Diseases of Pouch Foxes—Dr. Karl B. Hanson, U. S. Fur Farm Experiment Station, Saratoga Springs, N. Y.
47. Anesthetics for Small Animals—Their Indications and Uses (Illustrated)—Dr. E. R. Frank, Kansas State College, Manhattan, Kans.
48. Some Common Diseases of Cats—Dr. H. K. Miller, Mamaroneck, N. Y.

General Session

Thursday evening, August 27, 8 o'clock

49. World-Wide Prevalence of Infectious Live Stock Diseases—Dr. George W. Pope, U. S. Bureau of Animal Industry, Washington, D. C.
50. Studies in Idiopathic Prenatal Anemia of Young Pigs—Drs. Robert Graham, Frank Thorp, Jr., and W. A. James, University of Illinois, Urbana, Ill.
51. Foot-and-Mouth Disease and Vesicular Stomatitis—Dr. Kurt Wagener, Department of Hygiene, Veterinary College, Berlin, Germany.
52. Activities of the Food and Drug Administration in the Control of Misbranded Veterinary Preparations. Dr. H. E. Moskey, Food and Drug Administration, Washington, D. C.

CLINICS AND DEMONSTRATIONS

Friday morning, August 28, 9 o'clock

American Royal Pavilion

Dr. S. L. Stewart, Olathe, Kans., *Chairman*, Sub-committee on Clinics

GENERAL CLINIC*Demonstrations*

1. Results of Army Horse Type Breeding. Capt. J. A. McCallam, V. C., U. S. Army.
2. Physical Examination of Dairy Cows. Dr. E. L. Dickie, Louisburg, Kans.

The Holstein cows used in the demonstration are being furnished by Mr. G. G. Meyer, of Bashor, Kans. The DeLaval Magnetic Combine milking system used in the demonstration is shown and operated by the DeLaval Separator Company, of Chicago, Ill. "Facts and Figures," by Dr. O. C. Murphy, Milk Commissioner, Board of Health, Kansas City, Mo.

3. Value of Meat Inspection. Dr. J. S. Jenison, U. S. B. A. I. Inspector-in-Charge, Kansas City, Kans.

SPECIAL CLINICS

SECTION I—Cattle

Dr. Hugh M. McConnell, *Chairman*, Independence, Mo.

Demonstrations

1. Nerve "Symplex" in Cattle. Dr. R. F. Whitlock, Monett, Mo.
2. Enucleation of the Eye. Dr. R. R. Dykstra, Kansas State College, Manhattan, Kans.
3. Rumen Digestion in the Ox. Dr. R. S. Amadon, University of Pennsylvania, Philadelphia, Pa.
4. Udder and Obstetrical Operations. Dr. W. F. Guard, Ohio State University, Columbus, Ohio.
5. Anesthesia in the Ox. Dr. C. H. Covault, Iowa State College, Ames, Iowa.
6. Restraint of the Cow. Dr. V. A. Scott, John Tarleton Agricultural College, Stephenville, Texas.
7. Passing the Stomach-tube in the Cow. Dr. H. E. Kingman, Colorado Agricultural College, Fort Collins, Colo.
8. Breeding Efficiency in the Cow. Case of Experimental Hypocalcemia. Dr. W. L. Boyd, University Farm, Saint Paul, Minn.
9. Claw Operation in the Cow. Dr. T. H. Ferguson, Lake Geneva, Wis.
10. Anaplasmosis in a Cow. Dr. P. B. Darlington, Chanute, Kans.

SECTION II—Swine

Dr. C. E. Salsbery, *Chairman*, Kansas City, Mo.

Diagnoses and autopsies showing various lesions associated with a number of infectious and parasitic diseases, including hog cholera, erysipelas, necrotic enteritis, parasitoses, etc.

Demonstrators

Dr. J. S. Koen, Bloomington, Illinois.

Dr. Robert Jay, Sacramento, California.

Dr. Henry Hell, Wilton Junction, Iowa.

Dr. Charles Murray, Iowa State College, Ames, Iowa.

SECTION III—Small Animals

Dr. E. J. Frick, *Chairman*, Manhattan, Kans.

Demonstrations

1. The Handling of Fur-Bearing Animals from the Standpoint of the Veterinarian. Dr. Karl B. Hanson, U. S. Experiment Fur Farm, Saratoga Springs, N. Y.
2. Treatment of Fractures in Small Animals. Dr. E. B. Dibbell, Baltimore, Md.
3. Diagnosis of Filariasis in the Dog. Dr. R. P. Marsteller, Texas A. & M. College, College Station, Texas.
4. Postmortem Technic. Dr. E. A. Benbrook, Iowa State College, Ames, Iowa.
5. Discussion of cases presented by Dr. John F. McKenna, Los Angeles, Calif., and Dr. H. J. Milks, New York State Veterinary College, Ithaca, N. Y.
6. Action of Nembutal in the Dog. Dr. D. S. Jaffray, Chicago, Ill.

SECTION IV—Horses

Dr. L. A. Merillat, *Chairman*, Chicago, Ill.

Demonstrations

1. Caudal Anesthesia (for use in tail surgery, colics, colonic flushing, etc.). Dr. E. R. Frank, Kansas State College, Manhattan, Kans.
2. Medial and Cubital Anesthesia (for use in firing tendons, etc.). Dr. T. A. Sigler, Greencastle, Ind.
3. Standing Operation for Roaring. Dr. W. M. Smotherman, Huntsville, Texas.
4. Nerve Blocking for Dental Operations. Dr. L. A. Merillat, Chicago, Ill.
5. Intraspinal Administration of Tetanus Antitoxin. Dr. E. E. Patterson, Detroit, Mich.
6. Casting a Horse with a Lariat.

SECTION V—Sheep

Dr. I. E. Newsom, *Chairman*, Fort Collins, Colo.

Demonstrations

1. Parasites of sheep. Dr. Gerard Dikmans, U. S. Bureau of Animal Industry, Washington, D. C.

- A. Fecal examination for nematode eggs.
 - B. Administration of vermicide.
 - C. Chart showing life-history of stomach worm.
 - D. Specimens of parasites.
 - E. Pathological specimens showing effects of parasites.
 - F. Map showing distribution of parasites.
 - G. Postmortem technic.
2. Progressive pneumonia, specific arthritis in lambs, and foot-rot in sheep. Dr. Hadleigh Marsh, Montana Veterinary Research Laboratory, Bozeman, Mont.
 3. Castrating and docking. Drs. Harry E. Kingman, James Farquharson and Floyd Cross, Colorado Agricultural College, Fort Collins, Colo.

SECTION VI—Poultry

Dr. A. J. Durant, *Chairman*, Columbia, Mo.

Demonstrations

1. Use of a new and improved field test for pullorum disease in chickens. Dr. H. J. Stafseth, Michigan State College, East Lansing, Mich.
2. Tuberculin testing and methods of restraint in turkeys. Dr. W. R. Hinshaw, University of California, Davis, Calif.
3. Parasites. Prof. J. E. Ackert, Kansas State College, Manhattan, Kans.
4. Restraint and local treatment of fowls. Dr. A. J. Durant, University of Missouri, Columbia, Mo.

Parking Space at Kansas City

The Local Committee on Arrangements has prepared a list of garages and lots where cars may be parked during the convention. See official program.

APPLICATIONS FOR MEMBERSHIP

(See July, 1931, JOURNAL)

FIRST LISTING

- | | |
|--|---|
| CHAPMAN, W. B. | Leon, Iowa |
| D. V. M., St. Joseph Veterinary College, 1922 | |
| Vouchers: C. R. Fry and H. L. Stewart. | |
| ELLIS, CARLTON C. | 503 Dryden Rd., Ithaca, N. Y. |
| D. V. M., Cornell University, 1931 | |
| Vouchers: Donald W. Baker and C. E. Hayden. | |
| HUDDLESON, I. FOREST | Michigan State College, East Lansing, Mich. |
| B. S., Oklahoma A. & M. College, 1915 | |
| M. S., Michigan State College, 1916 | |
| D. V. M., Michigan State College, 1925 | |
| Vouchers: Walter W. Thompson and H. Preston Hoskins. | |

- KERSHAW, CASS J. 8043 Wornall Rd., Kansas City, Mo.
D. V. M., Michigan State College, 1930
Vouchers: E. R. Steel and H. Preston Hoskins.
- McGAVICK, JAMES A. 514 E. 30th St., Tacoma, Wash.
B. S., D. V. M., State College of Washington, 1924
Vouchers: E. E. Wegner and N. G. Covington.
- MACKELLAR, ROBERT S., JR. 329 W. 12th St., New York, N. Y.
D. V. M., Cornell University, 1928
Vouchers: C. G. Rohrer and Adolph Eichhorn.
- OGLESBY, W. T. Iowa State College, Ames, Iowa
B. S., Oregon State Agricultural College, 1928
M. S., D. V. M., Iowa State College, 1931
Vouchers: C. H. Covault and H. D. Bergman.
- SCOTT, DAVID C. Tekamah, Nebr.
D. V. S., Kansas City Veterinary College, 1905
Vouchers: C. H. Hays and Neil Plank.
- SNYDER, G. A. Perry, Iowa
D. V. M., Iowa State College, 1931
Vouchers: Geo. R. Fowler and C. H. Stange.
- WARD, R. L. Batavia, Iowa
D. V. M., St. Joseph Veterinary College, 1920
Vouchers: J. F. McCabe and Grant B. Munger.

Applications Pending

SECOND LISTING

- Bailey, Leonard Perry, South Charleston, Ohio.
Benner, Kenneth Leland, Bainbridge, Ohio.
Bennett, Paul Clifford, 288 E. 12th Ave., Columbus, Ohio.
Bloom, Frank, 37-19 Junction Ave., Corona, L. I., N. Y.
Buehler, Harold John, Saint Edward, Nebr.
Burris, James Thomas, Smithfield, Ohio.
Campbell, MacFarland, 601 W. B St., McCook, Nebr.
Caslick, Frederick George, Box 45, Versailles, Ky.
Crosbie, Glen Garold, 1115 E. Van Buren St., Phoenix, Ariz.
Drumm, Orville Herrick, 8518 109th St., Richmond Hill, L. I., N. Y.
Fenner, Walter Harmon, 821 W. Main St., Hillsboro, Ohio.
Geurkink, Walter, 50 E. Buchtel Ave., Akron, Ohio.
Hancock, Armor E., 2147 Neil Ave., Columbus, Ohio.
Hardy, W. T., Substation 14, Sonora, Texas.
Hodges, Harry G., 330 N. Van Dien Ave., Ridgewood, N. J.
Holloway, Sydney Hawtrey, 711 Boyd Bldg., Winnipeg, Man.
Kubin, Edison F., McPherson, Kans.
McPherson, James E., 308 E. 10th St., Okmulgee, Okla.
Miers, Granville John, Jackson Center, Ohio.
Moline, Ernest N., 135 N. Concord St., South Saint Paul, Minn.
Mueller, William Karl, 1524 Grayson St., San Antonio, Texas.
Nankervis, Thomas Presow, 918 E. Camp St., Ely, Minn.
Pastors, Charles Robert, Rayland, Ohio.
Richardson, Leonard Robert, R. F. D. 8, Box 35, Akron, Ohio.
Simmons, Henry C., Brookhaven, Miss.
Smiley, H. Devore, Waynoka, Okla.
Snyder, Jesse B., 1419 1/2 N. Federal Ave., Mason City, Iowa.
Stam, Edward L., 1632 W. Roosevelt St., Phoenix, Ariz.
States, Carl S., Wilmington, Ohio.
Volkmar, Fritz, 39 W. Frambes Ave., Columbus, Ohio.
Wells, John Lyle, Blue Springs, Mo.
Wenger, Raymond Dean, 910 W. Lake St., Minneapolis, Minn.

The amount which should accompany an application filed this month is \$7.08, which covers membership fee and dues to January 1, 1932, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

Connecticut Veterinary Medical Association. Norwalk, Conn. August 5, 1931. Dr. Edwin Laitinen, Secretary, 993 N. Main St., West Hartford, Conn.

East Tennessee Veterinary Medical Society. White Surgical Supply Co., Knoxville, Tenn. August 8, 1931. Dr. R. E. Baker, Secretary, Morristown, Tenn.

Nevada State Veterinary Association. Reno, Nev. August 10, 1931. Dr. Warren B. Earl, Secretary, 7 Gladianos Bldg., Reno, Nev.

Chicago Veterinary Medical Association. Atlantic Hotel, Chicago, Ill. August 11, 1931. Dr. C. L. Miller, Secretary, 508 S. Humphrey Ave., Oak Park, Ill.

Kansas City Association of Veterinarians. Baltimore Hotel, Kansas City, Mo. August 11, 1931. Dr. J. D. Ray, Secretary, 1103 E. 47th St., Kansas City, Mo.

Hudson Valley Veterinary Medical Society. Kenosha Lake, N. Y. August 12, 1931. Dr. J. G. Wills, Secretary, Box 751, Albany, N. Y.

Tulsa County Veterinary Association. Tulsa, Okla. August 13, 1931. Dr. J. M. Higgins, Secretary, 3305 E. 11th St., Tulsa, Okla.

Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. August 19, 1931. Dr. W. L. Curtis, Secretary, 1264 W. 2nd St., Los Angeles, Calif.

National Veterinary Medical Association of Great Britain and Ireland. Norwich, England. August 22-28, 1931. F. Knight, General Secretary, 2, Verulam Buildings, Gray's Inn, London, W. C. 1, England.

American Veterinary Medical Association. Baltimore Hotel, Kansas City, Mo. August 25-28, 1931. Dr. H. Preston Hoskins, Secretary, 537 Book Bldg., Detroit, Mich.

Missouri Veterinary Medical Association. Hotel Baltimore, Kansas City, Mo. August 27, 1931. Dr. J. D. Ray, Secretary, 1103 E. 47th St., Kansas City, Mo.

New York City, Veterinary Medical Association of. Academy of Medicine, 5th Ave. and 103rd St., New York, N. Y. September 2, 1931. Dr. John E. Crawford, Secretary, 708 Beach 19th St., Far Rockaway, Long Island, N. Y.

EPIDEMIOLOGIC DATA OF BRUCELLIASIS, WITH REPORT OF TWO HUMAN CASES*

By J. C. GEIGER, *San Francisco, Calif.*

George Williams Hooper Foundation for Medical Research

University of California

The significance of the problem of undulant fever to the clinician and to the public health worker has been stressed to such an extent that some of the now known facts should be made available to the medical profession and to the public. There is, of course, another reason for doing this in that the practicing physician may be stimulated to scrutinize most carefully such cases that may resemble the disease, especially as to all possible sources of infection. At the very beginning, it may be necessary to call attention to the statement of Evans, for in this disease, as perhaps in no other, the laboratory may offer decided help to the oftentimes puzzled and thoughtful clinician. This author states that there is no disease in which the physician is more dependent upon laboratory findings for a correct diagnosis. The symptoms are various, indefinite and suggestive of other diseases, particularly typhoid fever, malaria, tuberculosis and rheumatism. To these may now be also added focal infections, sinusitis, appendicitis and tularemia. Moreover, some cases that were recently investigated in California were originally diagnosed as acute anterior poliomyelitis. It is interesting to note that Shaw reported the isolation of a porcine strain from the spinal fluid of a case resembling acute anterior poliomyelitis.

SYMPTOMS

In many diseases certain symptoms can often be spoken of as classical. Undulant fever, however, has not this distinctive characteristic at this moment. The habitual, careful, clinical observer may note as first symptoms, a weakness, generalized in type, usually occurring in the afternoon, and accompanied by headache and muscular pains, loss of weight, and persistent cough. Fever and chills may precede the above symptoms or actively accompany them. Profuse perspiration is frequently noted, with or without exertion, and oftentimes very apparent while in bed. The amount of temperature is variable but quite

*Presented at the sixty-seventh annual meeting of the American Veterinary Medical Association, Los Angeles, Calif., August 26-29, 1930.

high in some cases. Its daily irregularity may be a warning to guide in a diagnosis. The temperature may completely subside, to be followed within a few days by another wave. This febrile series of waves may last for some time. The blood picture is that of anemia, perhaps a slight leucopenia and lymphocytosis. Joint symptoms are usually present even to the extent of interference with movement. The outstanding physical finding is an enlarged spleen. Constipation is not infrequent, along with a decided irritability accompanied by insomnia. Such complications as orchitis, epididymitis and prostatitis have been noted in the male. Abortion in pregnant women has been attributed to this disease. Relapses are not infrequent, and the length of the illness may persist for long periods.

UNIVERSITY OF CALIFORNIA COMMITTEE

There has been considerable publicity, both medical and otherwise, as to the public health aspects of the generally called undulant fever problem. The recently published bulletin of the California State Department of Public Health¹ on this subject, and which was prepared by the University of California committee for the study of this disease, is excellent, timely and, fortunately, conservative. The introduction feature of this bulletin covers fully the history, and the outstanding clinical characteristics are thoroughly stressed. Perhaps of greatest importance to the health official are the chapters on the epidemiology and control measures. The epidemiological feature carries the following significant statements as to the infection from raw milk.

Raw milk from goats or cows should not be directly blamed unless laboratory data are obtained, as the shedding of organisms in the milk or the extent of the infection in the herd determined by agglutination tests or by history of recent abortions in the herd or the recent use of live organism abortus vaccines, or by positive results from direct inoculation of guinea pigs of centrifugalized specimens of pooled milk samples. Any assumption that infected raw milk is the causative factor should be carefully scrutinized and all other possible avenues closed. It is possible, however, that continuous ingestion of small numbers of abortus organisms of any type may lead to mild or unrecognized cases.

Moreover, this bulletin suggests the following control measures:

1. The reactors are removed from the herds, and either slaughtered or kept on an isolated farm. The milk when properly pasteurized at not less than between 140 to 145° F. for 30 minutes and under supervision can safely be sold for public consumption. In the home the raw milk is preferably boiled for 5 minutes.

2. The non-reacting animals are kept in the milking-line and continue to furnish raw milk. No animal should be added to this lot until it has passed two serological tests for *Brucella*. The interval between the tests may range from 2 to 6 weeks. Additional tests of the entire non-reacting group should be continued at not more than six-month intervals, in order to determine if all the reactors have been eliminated.

Apparently, then, to reduce the disease in cattle, the first step necessary is to raise healthy heifer calves, for there is an ever-increasing public health demand for healthy cattle. One feature is the recognition that all feed must be free of all contaminating discharges. In this connection, Haring² concludes:

Calves are not susceptible to abortion disease until they reach breeding age and may be fed on the raw milk of abortion-infected cows without predisposing them to infection after maturity. The abortion bacilli which they may swallow with the milk eventually die or are eliminated in the excretions, so that soon after weaning, heifers are usually free from abortion infection. As they approach maturity, they become increasingly susceptible and are likely to become infected and abort during their first pregnancy if they come in close contact with infected cows.

This analogy may be applied, in part, to humans, since the incidence of the disease in the young is not significant. Pasteurization of milk, however, so often stressed as a prime control necessity, is admittedly dependent upon the thermal death point of the *Brucella* group of organisms or any other contaminant. Arnold³ found 40 minutes at 140° F. was required to kill the porcine strain of *B. abortus*. Certainly there is every indication for further work with a large number and variety of these strains. Perhaps, this may lead to the establishment of a definite and accepted temperature for pasteurization, with proper safety factor range, and the recognition that the extraordinarily important commercial pasteurization must be rid of its defects and remain always under expert technical supervision.

A VETERINARY PROBLEM

To many observers the problem of abortion disease in cattle and even brucellosis in man is more of a veterinary problem than that of public health. Surely, its solution is at present obscured in a mass of detail that needs intelligent unraveling, in order that practical preventive measures can be adopted with some degree of certainty of continuing results.

Apparently, one matter that has disturbed the veterinary profession has been the use of live *abortus* vaccine. The American Veterinary Medical Association Committee on Abortion, at the

1929 meeting, in Detroit, unqualifiedly condemned the use of living organism abortus vaccines. Moreover, the Executive Board, in December, 1929, moved that advertisements of living organism abortus vaccine be removed from the JOURNAL of the A. V. M. A. It is indeed of interest to note that Hart and Traum,⁴ in 1925, concluded:

It has been demonstrated that in a certain percentage of lactating animals injected with *Bacterium abortum* (living) under the skin of the neck, the organisms so injected or their progeny will gain access to the udder and be eliminated with the milk.

Vaccinated animals may, therefore, become spreaders of the infectious agent under these conditions and cannot with safety be moved into uninfected herds. There appears to be no doubt that live organism abortus vaccines may save losses to dairymen, but it is a dangerous procedure with reference to human health when such cultures are used in herds supplying milk for human consumption in the raw state.

VACCINES MAY SPREAD THE DISEASE

Torrey and Hallman,⁵ in reporting on the pathogenicity of abortus vaccines on the market, for guinea pigs, made the statement that three vaccines that were tested showed more virulence than many recently isolated strains from aborting cattle. This possible etiologic factor, however, has been somewhat discounted by the findings of Otero.⁶ This author reports producing undulant fever in man by direct feeding of *B. abortus*, variety porcine, in milk, but not with the bovine variety. Otero further states that "this evidence should be by no means considered conclusive." In this connection, we have the significant statement of Meyer and Eddie⁷ that probably every *B. abortus* strain, when in sufficiently large dosage, is pathogenic, provided susceptible monkeys are used. Moreover, these authors speak of continuous ingestion of small numbers of abortus leading to mild or unrecognized cases. It may be possible that eventually a non-virulent strain for vaccines may be developed but the use of live organism *B. abortus* vaccines should at present be kept under close supervision of competent research institutions. The action of the American Veterinary Medical Association appears amply justified, notwithstanding the opinion of Bastai⁸ that *B. abortus* of presumably bovine variety is pathogenic only for cattle; and that of Orr and Huddleson,⁹ in that the susceptibility in humans is low, therefore, the relatively low incidence.

Contact infection is considered by many investigators as the most likely source of infection. By contact is meant the laboratory worker with abortus strains or infected animals, the farm worker, the goat-herder, the cow herd or swine attendant who might handle infected material, particularly in the abortion period, the workers in slaughter-houses, and the veterinarian. Direct contact from human to humans is unknown and exceedingly doubtful. The investigator, however, should not be unmindful of abortion in women, especially in rural communities.

TWO CASES OF BRUCELLIASIS

Two human cases that apparently represent contact infection with ample clinical symptoms and laboratory confirmation are herewith recorded. It must be appreciated, however, that there may be many others with the same duties, with the same epidemiologic possibilities of infection by contact, that do not noticeably show clinical symptoms or even sometimes not offer confirmatory laboratory tests. These constitute the so-called "silent infections" and are generally seen in laboratory workers or field veterinarians or herd attendants of cows, goats and swine. Whether the same conditions exist in animal herds, thereby constituting epidemiologic possibilities of the spread of the disease by carriers that are perhaps non-reactors, missed or border-line cases or reactors, is, at present, an obscure factor.

Burnet,¹⁰ Carpenter,¹¹ Kristensen and later Tramontano reported no agglutinins present in positive clinical cases. To offset such findings, a diagnostic skin reaction has been suggested. This was evidently done first by Fleischner and Meyer,¹² in 1918. Burnet¹³ used broth filtrates, calling it "melitine," while Trenti and others used killed salt suspensions of the organism. Giordano¹⁴ and more recently Huddleson,¹⁵ using killed suspensions, reported positive results but these were generally accompanied with rather severe local reactions. Urback^{16, 17} called his material "bangin." The experiments of Schoenholz and Meyer¹⁸ with guinea pigs showed that skin reactions are elicited in abortus-infected animals by an acid-precipitable fraction of the filtered call solution. Further work in this field is decidedly indicated. Particularly could this reaction be applied in valuable or experiment herds, when the blood reactors show negative, yet infection continues to appear at stated intervals.

Both of the clinical cases under discussion had duties on the University Farm, Davis, one (F. W. F.) with the experiment

swine herd and the other (O. C. B.) with the isolated dairy abortion herd. The latter, however, came into contact with infected hogs since the proved blood reactors were placed in the same corral with the cows in May, 1929. The importance of this may be significant, as repeated blood cultures taken at the height of the illness from the patient O. C. B. yielded *B. abortus* (porcine variety).

The experiment swine herd at the University Farm, Davis, has been in existence since 1908. In 1919-1920, as described in the paper of Howarth and Hayes,¹⁹ abortion infections became prevalent. This herd remained clean or negative for reactors from 1920 until January, 1929. The following regulations now exist for the prevention of infection of attendants of this herd:

MODES OF INFECTION

The two accepted modes of infection are ingestion and contact. Infection by ingestion need be only briefly touched upon, since contaminated milk should not be consumed raw by attendants. There is, however, the possibility of infection through the handling of infected discharges with bare hands and the consumption of food thereafter without previously scrubbing with soap in running hot water. Inhalation of infected dust is an epidemiologic probability of minor importance. However, infected discharges, such as feces, should be removed with as little dust disturbance as possible.

Contact: Discharges of any character such as urine and feces, but particularly the afterbirth and the resulting material, must not be handled with bare hands or arms. Moreover, separate working clothes easily washable, sterilized or disinfected, including boots or shoes, must be worn, especially on infected premises. Autopsies must be performed with rubber gloves and the instruments carefully sterilized afterwards. Any culture work subsequently done in the laboratory must be made by handling infected material with sterile instruments. All carcasses, proved infected, or suspected, must be handled as infected material and removed from the autopsy rooms to the incinerator, either wrapped or in covered containers, and the material carefully removed. The container must be properly disinfected afterwards or at stated intervals.

Infected animals must be held under quarantine and not be accessible to visitors or students. After an abortion, the premises or pens must be scrubbed with hot water and exposed to the

action of a strong disinfectant. Feeding and watering troughs used for infected animals should be handled only with gloves, and these, with all other contaminated surfaces, subsequently disinfected.

Case 1: O. C. B., age 23, married 4 months. Duties consisted of herdsman to the isolated dairy abortion herd. Hogs that were proved abortion blood reactors were placed practically in the same corral with the cows in May, 1929. This patient, however, had been employed for about a year previous. The hog attendant employed at this time did not give and has not since given any history of illness, but did use the same tools for cleaning and for feeding as did the attendant for the cows (O. C. B.); was frequently present in space allotted to hogs; in fact, passed through in reaching the cows for milking. Dust was exceedingly prevalent and generally stirred up by the prevailing winds. Likewise, after rain, the field was exceptionally muddy. Two cows died, but from other conditions no cultures were made, nor were guinea pigs inoculated with autopsy material. The patient knew of the possible danger of drinking the milk from the cows under his care and gave every assurance of not consuming any in the 14-month period before his illness appeared. The onset date of illness was about December 1, 1929. The first symptom noted was headache, particularly at night, and accompanied by sweats and chilly sensations. The appetite was decidedly irregular and constipation was usually present. Later, restlessness, nervous tension, and insomnia appeared. An arthritic type of pain, especially in the knees, began to be manifest along with a tired feeling. The patient then noticed a feverish condition, but at irregular intervals, and looked anemic. Up to this time no doctor was in attendance or had been seen, and when his blood was routinely tested along with many veterinarians, by the agglutination test, at Davis, in January, 1930, it agglutinated *B. abortus* strain antigens to a decidedly high titre. The patient was admitted to a hospital on January 15, 1930, and became afebrile on March 27, 72 days after entering the hospital, and 117 days after the onset. He did not, however, return to work until May 26, and even now, 6 months after apparent recovery, has not returned to his previous normal condition. Besides a high blood-serum agglutination titre, blood cultures taken at the Woodland Clinic were positive on January 6, January 20 and April 14, 1930, for *B. abortus* which by subsequent tests is apparently a porcine variety. Blood culture taken on June 19,

1930, was negative. This patient received a number of injections of vaccine prepared according to the methods of Caronia with apparently good results.

Case 2: L. W. F., age 27, married, no children. Duties as herdsman for experiment hogs, and has been so continuously since May, 1926. Was a student in animal husbandry in 1924 and 1925. Specifically, the duties assigned to this herdsman are of every character and phase: feeding, cleaning pens, handling hogs when ill, and all material following abortions. No precautionary measures to prevent infection were taken other than the washing of hands in soap and water. The actual onset is doubtful but presumably in August, 1929. The complaints then were mainly a loss of appetite, tired feeling, and loss of interest in work. Patient took trip in August, to Trinity County, for about two weeks, drinking raw milk, to his knowledge, for the first time in years, from range beef cows. August 15, patient complained of sudden attacks of severe backache from which various drugs, taken under personal supervision, gave no relief. There were chilly sensations, but no definite chills, insomnia, and a general feeling of illness. These symptoms continued until December, when pain increased, especially over the right side of the back, accompanied by chilly sensation, and profuse night sweats. Being quite disabled for work, the patient went to a physician, for the first time, who removed the tonsils and later insisted upon some teeth being extracted. Unfortunately, the symptoms increased and the temperature began to be as high as 102 to 104 in the afternoon. Was sent to a hospital January 19, 1930. The symptoms complained of then were chills, profuse sweats, constipation, extreme restlessness, high temperature, and pains in the back. The patient remained in the hospital two weeks, but illness continued, and he was confined to home until May 15, 1930. The patient received 10 injections of lysed vaccine (Caronia) over a period of 21 days, and the fever disappeared on the 26th day after beginning this treatment. All blood cultures were negative but his blood serum agglutinated *B. abortus* strains to a moderately high titre. (Both of the cases were under the care of Dr. Harbinson (now deceased), of the Woodland Clinic, and at the time a member of the University of California Undulant Fever Committee, and both have been made compensative by the State Industrial Accident Commission.)

The epidemiologic data of these cases are typical of the difficulties surrounding the tracing of the infection. Case 1, an attendant of the cattle infected with *Brucella*, had a porcine type of infection. The type of infection in the swine herdsman is unfortunately unknown. Nevertheless, certain assumptions may be drawn from this herd itself. For instance, case 2 handled new born pigs, the afterbirth, and discharges of hogs infected with *Brucella*, without ordinary precautions, in March, June, July, August, and November, 1929. From an infected hog in March, 1929, there was isolated a strain now known as Porcine No. 55, and presumably a laboratory attendant (Mrs. L.) probably received her infection while handling these cultures or perhaps the autopsy material. The epidemiologic assumption that these are contact cases appears to be based on indisputable facts, but it must be admitted that in these cases, as in the investigation of many others of brucellosis, the chain of evidence is quite broken or not in logical sequence, and sometimes decidedly obscure. Therefore, the investigator must approach his solution with care and circumspection. It is very interesting to note that case 2 presents at first a chronic type of illness, which aspects can be considered to have changed or precipitated promptly to the acute stage following an operation for the removal of tonsils. Apparently, operative procedures of the simplest character as the removal of tonsils or teeth and perhaps other superimposed infections may so disarrange the slight immunity or organized defenses of the body to brucellosis infection to such an extent as to influence the production of an acute illness from undulant fever or brucellosis. Furthermore, the infection in man has generally a marked septicemic phase, with the spleen probably most affected and tissue localization reduced, with perhaps this exception, that slow suppurative processes of bone, not quite well explained, should be regarded with suspicion.

REFERENCES

- ¹Univ. of Calif.: Calif. State Dept. of Pub. Health Spec. Bul. 50 (1930).
- ²Haring, C. M.: Calif. Agr. Ext. Ser. Cir. 33 (1929).
- ³Arnold, L.: Ill. Health Mess., Jan., 1930; and Amer. Jour. Pub. Health, xx (1930), p. 160.
- ⁴Hart, G. H., and Trauman, J.: Univ. of Calif. Tech. Paper 19 (1925).
- ⁵Torrey, J. P., and Hallman, E. T.: Jour. A. V. M. A., lxxv (1930), n. s. 29 (1), pp. 7-16.
- ⁶Otero, P. M.: Porto Rico Jour. Pub. Health & Trop. Med., v (1929), 2, pp. 144-157.
- ⁷Meyer, K. F., and Eddie, B.: Proc. Soc. Exp. Biol. & Med., xxvii (1929), pp. 222-224.
- ⁸Bastai, P.: München. Med. Wehnschr., lxxiv (1927), pp. 2141-2142.
- ⁹Orr, P. F., and Huddleson, I. F.: Symposium, Undulant Fever, Amer. Pub. Health Assn. (1929).
- ¹⁰Burnet, E.: Bul. de l'Inst. Past., xxiii (1925), p. 10.
- ¹¹Carpenter, C. M.: Rpt. N. Y. State Vet. Coll., 1925-1926 (1927), pp. 178-181.
- ¹²Fleischner, M. S., and Meyer, K. F.: Amer. Jour. Dis. Child., xvi (1918), p. 268.
- ¹³Burnet, E.: Arch. de l'Inst. Past. de l'Afrique du Nord, ii (1922), p. 187; and Arch. de l'Inst. Past. de Tunis, xiii (1924), 1, pp. 7-19.
- ¹⁴Giordano, A. S.: Jour. Amer. Med. Assn., xciii (1929), 25, p. 1957.
- ¹⁵Huddleson, I. F.: Jour. Amer. Med. Assn., xciv (1930), pp. 1905-1907.
- ¹⁶Urbach, E.: Wien. klin. Wehnschr., xlii (1929), pp. 391-394.
- ¹⁷Idem: Zentralbl. f. d. ges. Hyg., xxi (1930), pp. 642-643.
- ¹⁸Schoenholz, P., and Meyer, K. F.: Jour. Inf. Dis., xl (1927), 3, p. 453.
- ¹⁹Howarth, J. A., and Hayes, F. M.: Jour. A. V. M. A., lxxviii (1931), n. s. 31 (6), pp. 830-848.

THE VETERINARY HOSPITAL

With Special Reference to Accommodations for Small Animals

By HORST SCHRECK, *El Paso, Texas*

The planning of a modern veterinary hospital is of a complex and technical nature. The units comprising it are so diversified that it requires much thought to coördinate them into one workable whole.

The veterinarian contemplating the erection of a hospital, or the remodeling of an old building, should have the vital elements clearly in mind from the first inception of the idea to the final equipment of his institution and the eventual attempted standard of practice and performance. The material presented should stimulate his constructive mental faculties and leave him to adapt the examples to his personal needs.

The primary purpose of a veterinary hospital is to afford a veterinarian an opportunity to apply the knowledge, experience and skill of his profession to the animals in his care, for his profit, in a measure commensurate to his effort, business acumen and skill. The first consideration is immediately followed by its direct opposite, that the veterinary hospital must be an asset to the community, afford its inhabitants a means for having their pets or other domesticated animals properly hospitalized and treated by a competent veterinarian, whose skill and services are equal to his fees, which shall be reasonable and just. The third consideration is his obligation to his patients, toward which, though they are not capable of holding him accountable for his trust, he has assumed a deep and binding obligation upon entering his profession. Unless these conditions, driving to the same focus, are satisfied, the veterinarian's venture will forever be a mediocrity or even a total failure, most certainly never a success. The veterinarian then must have that acumen which inspires confidence in his clients and complete resignation by his patients. Ideals, even though not practical at given times, should nevertheless be our starting point, and if the solutions presented will often smack of such ideals, the application of them will ever lead to practical facts and results.

During recent years, the number of small-animal hospitals has multiplied very rapidly. Many are not worthy of the name. The proprietors of some are nothing more than purveyors of

merchandise. Their stores have a few cages added as blinds for the accommodation of would-be patients. Their entrances are cluttered up with all kinds of dog-foods, dog-collars, goldfish, bird-seed and other varieties of claptrap. On the other hand, we have seen the development of quite a few institutions that are in every sense worthy of the designation, "Hospital for Small Animals." We hope that the number of these will increase and that their excellence will sound the death-knell to the veterinary pet-store selling patent remedies over the counter.

It is a long way from the old veterinarian's stand in the livery stable to the contemporary, modern and up-to-date veterinary hospital, and yet in most instances it is a clear case of evolution.

With the cessation of extensive horse activities came the closing curtain for the horse stable. Many a veterinarian was left with a stable on his hands. A good many were fortunate enough to have them turned into garages or bowling-alleys, but what of the man who wanted to continue in practice? What was he to do with his two rows of horse stalls, with the one front-center entrance, with a cubby-hole here for the congregation of loafers and a cubby-hole there for casting paraphernalia and harness? What should he do with the hayloft? How could he use the dark stable with the munificent allowance of two square feet of light and air per horse on only one side of the building? The task no doubt seemed hopeless to many a man. Others, not scratching their heads very hard, used the thing as it was, while again some acted probably a bit too radically, tearing down the entire structure and setting up something new about which they knew nothing, much to their regret today. It is doubtful if there are many old horse stables left, but no doubt there are still some places that are revamped stables and where the job was badly done. Strange as it may seem, these places can be and have been remodeled into very creditable small-animal hospitals at a reasonable cost.

REMODELING

To illustrate the possibilities of such transformations, we have two very striking examples:

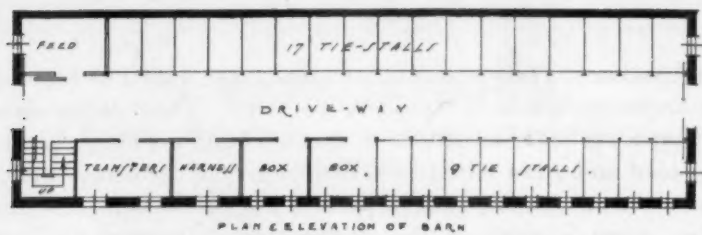
Example A:

Location: Pacific Northwest.

Type of building: Brick stable for 28 horses. Window light on only one long side of building.

Size of building: 35' 0" x 120' 0".

Second floor: Hayloft.



PLAN ELEVATION OF BARN

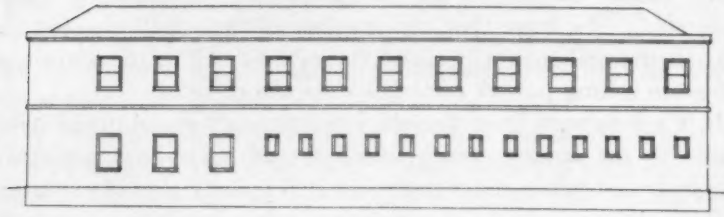
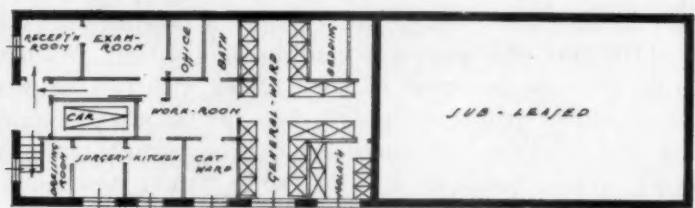


FIG. 1.



PLAN & ELEVATION AFTER REMODELING

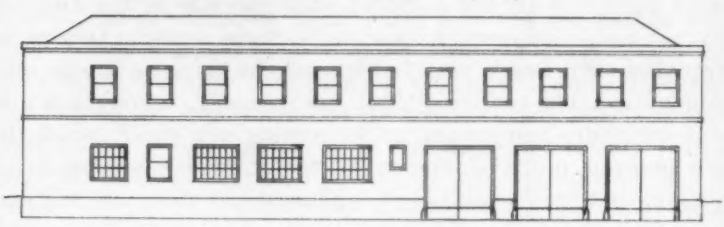
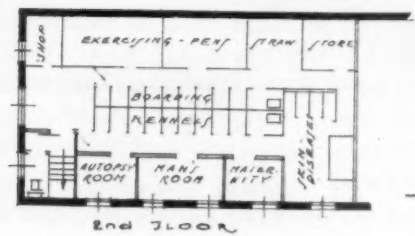
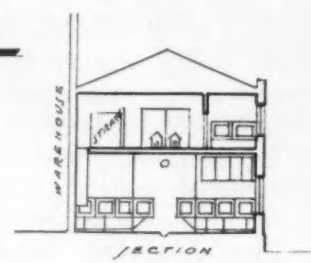


FIG. 2.



2nd FLOOR



SECTION

FIG. 3

A five-year lease was taken on the entire building. (See figure 1.) Half of it was subleased as a garage. A fireproof partition was thrown up to the roof. The front half, with upstairs, was remodeled at a cost of about \$4,000.00, including equipment. Large factory sash-windows were installed along the open street side, self-draining concrete floors laid down, the large front entrance transformed into a vestibule with entrances to the reception-room, garage and upstairs boarding kennels. Partitions were placed interiorly for the reception-room, examining-room, office, surgery, and other units, all in conformity with the existing columns. Upstairs, in addition to the boarding kennels, a man's room and an autopsy-room were installed. (See figures 2 and 3.)

Example B:

Location: Southwest.

Type of building: One story veterinary hospital with stable for 18 horses. Light on four sides of building.

Size of building: 30' 0" x 118' 0".

This building went through two periods of reconstruction, and a third remodeling or addition is contemplated. The first one (figure 4), in the earliest post-war days, as a matter of fact, was only a reduction of horse-stalls to dog-stalls, the latter being built on the concrete floor, with lack of all light and air, a breeding place of the first order for all infections. A few outside rooms were added. The second transformation (figure 5) followed the acquisition, by an outright purchase, of the building and lot. This change was more radical and resulted in a very creditable hospital. No changes were made in the exterior of the building beyond the placement of two sky-lights, and the closing of the large front entrance with a plate-glass window. All waste space was eliminated and the number of kennels was increased from 35 to 63. A new operating-room, cat ward, bath and clipping-room were provided, the former operating-room changed to an examining-room and a drug dispensing room added. (See figure 6.) Partitions were left intact as far as possible. The horse operating-table was knocked down and reduced to a substantial dog-clipping table. All kennels were brought away from the outside walls, reducing uncomfortable heat exposure in summer and cold and dampness in winter. Two auxiliary drug stations were placed, one in the cat ward and one in the general ward. Three "B. S." (back soon) kennels were placed in the vestibule.

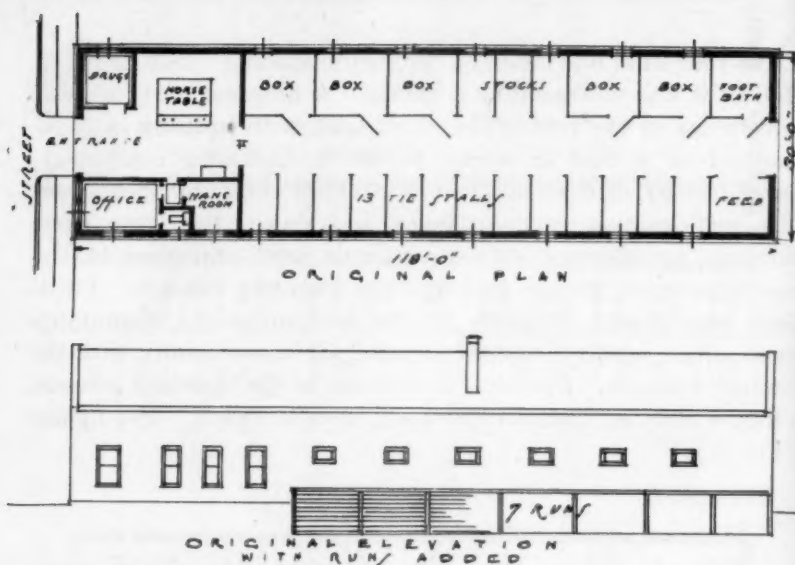


FIG. 4.

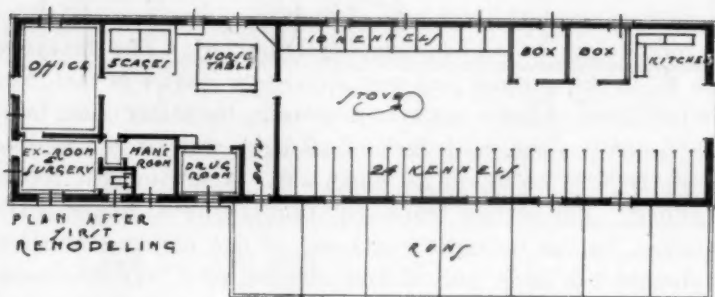


FIG. 5.

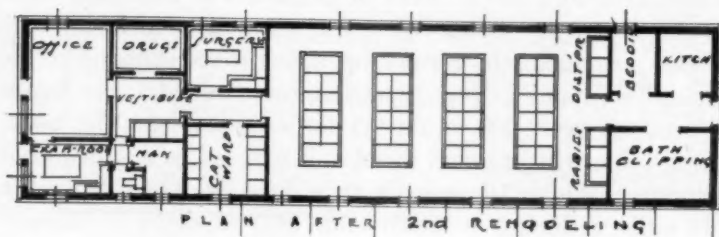


FIG. 6.

Of course neither of these two cases could be repeated, for circumstances differ with every case. They merely are presented as showing remodeling possibilities.

BUILDING A HOSPITAL

The requirements of veterinarians for attending to their patients are manifold and varied, and are usually determined by the type of their practice, the size of the community and, last but not least, the small-animal population in their territory. The man with an out-patient practice does not hospitalize patients, as he has no accommodations for them. In other words, he conducts a *clinic*. The general practitioner, with kennel accommodations near his office for just a few patients, maintains *accommodation kennels*, in addition to his facilities for taking care of a few of the larger animals. From this would evolve the *small hospital* for about ten to twenty-five small animals, superseded by the *large hospital*, the capacity of which is limited only by competition. It may eventually spread out into a *suburban hospital*, with unlimited facilities for expansion. Sooner or later the wasteful practice of several veterinary hospitals in one city duplicating much of their work will be realized, and as veterinarians become more tolerant of each other, the establishment of *coöperative hospitals* in large cities will be the order of the day. Some of these will progress to the *near-educational institution* and afford opportunities for young men to study, under proper instruction, the nursing and care of animals and be developed into capable aids to veterinarians, many of them eventually culminating their ambitions with a veterinary education at a *veterinary college*.

The steps of progress then are:

The clinic (as collection point for coöperative hospital).

The accommodation hospital facilities.

The small hospital.

The large hospital.

The suburban hospital.

The coöperative hospital.

The hospital with educational facilities.

The veterinary-college hospital.

Once the administrative policy and hospital procedure have been established by a final decision, no change should be made therefrom. The importance of their definite bearing upon every portion of the hospital from foundation to roof cannot be over-

emphasized. A hospital that shows disordered or wasteful functions most likely has been planned without regard to any predetermination of function. Those who will eventually operate and manage the building, together with the designer, should definitely decide the layout of the hospital, down to its smallest details. Therefore, they must be clearly visualized in advance.

Equipment is of first importance in a hospital that is to give good and efficient service. No equipment should be left for future consideration. It must be considered as part of the hospital and taken care of in the planning.

EQUIPMENT

Equipment resolves itself into fixed and movable equipment. Fixed equipment calls for structural provision to give it proper placing in the building, or it may require plumbing, heating, ventilating or electrical connections to make it effective.

Built-in or fixed equipment consists in general of:

- Kennels and cat cages.
- Kitchen and laundry equipment.
- Laboratory and pharmacy equipment.
- Built-in cases, counters, bins and shelving of all kinds.
- X-ray equipment and lockers.
- Plumbing fixtures.
- Bathing and drying facilities.
- Bedding and storage facilities.

Movable equipment, as essential as fixed equipment, demands proper floor and wall space. For that reason it must be correctly and definitely decided upon. *Movable equipment* items in general are:

- Movable kennels and cages.
- Chairs and tables.
- Desks and filing-cases.
- Operating, examining, autopsy and dressing tables.
- Basin, instrument and irrigation stands.
- Anesthetizing equipment.
- Food-tray carts.
- Rolling drug-stations.
- Clipping equipment.
- Checking arrangement for dog chains, collars, leads and restraint material.

Janitor equipment and many other items, all absolutely essential to the successful operation of a veterinary hospital, and for all of which a place must be provided.

It is never good practice to predetermine room or department size and then try to fit the equipment into it. The use of each room must be definitely foreseen and provision made for the equipment to go therein. It must be a labor- and step-saving arrangement and must economize space. The best arrangement will result in the best room size, and it can only then and there be made part of the general plan. Many untoward and unnecessary building extras in this manner will be eliminated and the finished product will be an orderly and business-like arrangement. Equipment *will not place itself*, and there is no reason why it should not be considered in the very beginning of the procedure. If planning is done in a haphazard manner, the results will be far from gratifying. Some rooms will be unnecessarily large, wasting valuable cubic content and increasing maintenance cost and financing. Others in turn will be too small, cramped and inefficient and will increase operating cost.

THE ELEMENTS

The hospital divides itself into a *productive portion* and a *non-productive portion*. The elements of the productive portion are:

- Kennels and cages (wards).
- Examining-room and dispensing pharmacy.
- Operating-room.
- Bath and clipping-room.

The elements of the non-productive portion are:

- Vestibule.
- Reception-room.
- Office.
- Kitchen.
- Drug-room.
- Dressing-room.
- Work-room.
- Autopsy-room and crematory.
- Hallways, corridors, other intervening spaces.
- The man's room.
- Storage-room.
- Garage.

Units of questionable standing:

- The laboratory.
- The X-ray unit.

All other things being equal, it is the proportion in square area of the productive units to the non-productive units that determines the hospital's economic success. It follows then that the most economical hospital is the one in which the practical minimum space required for the productive units covers the practical maximum portion of the total, or in which the smallest (least) number of square feet of lot area is consumed to produce one square foot of productive area.

THE PRODUCTIVE UNITS

The kennel and the cage: The basis of a hospital is the bed. Without it there is no hospital. Without a kennel, cage or stall there is no veterinary hospital. Therefore the kennel is the guiding unit of all else that follows. Any one of the other ele-

TABLE I—Measurements of various breeds of dogs

BREED	TIP OF NOSE TO TIP OF TAIL CARRIED NORMALLY (INCHES)	HEIGHT OF HEAD CARRIED NORMALLY (INCHES)
Great Dane	44	36
Shepherd	36	30
Setter	36	30
Pointer	30	30
Airedale	30	26
Bull terrier	28	24
Samoyed	24	24
Chow	24	24
English Bull	22	18
Fox terrier	18	16
Boston terrier	18	14
Spaniel	20	12
Chihuahua	10	8

ments may be eliminated or consolidated, but not so the kennel.

Kennel is a word derived from the Latin *canis*, plus *ile*, a suffix, denoting a place where animals are kept (*canile*), a house, place or cot for a dog. Ordinarily such a contrivance would satisfactorily confine a dog at home, but not so in a hospital. The dog, upon entering the hospital, unless he is too sick to care, or well acquainted at the institution, is determined to return home. Most veterinarians can recall some crafty tricks to that end. In consequence we have to call a cage to our aid. "A *cage* is a box-like receptacle or enclosure for confining birds or wild beasts. It is made with open spaces on one or more sides and also often at the top, by the use of wire slats or rods or bars of iron according to the required strength." (*Century Dictionary*) Now curiously

enough we do not mind speaking of a cat cage, but do object, and most certainly the veterinarian's client will object, to the idea of a dog cage. So we speak in hospital parlance of the "dog kennel" and the "cat cage." The dog kennel in fact is a dog cage. A cat cage and a dog kennel will then differ only in name and size much more than in appearance and structure.

Kennels may be constructed entirely of wood, wood and wire, sheet metal or iron. Glass may be incorporated. They may be of permanent masonry partitions, with grilled front or entirely of wrought iron. The size of the kennel ultimately determines the size of the hospital. And while we still have the proverbial cat-holes in the barn door, one for the big cat and one for the little cat, we should have kennels for big dogs, kennels for medium-size dogs, and cages for cats and small dogs.

(To be continued)



Part of the deer herd in Swope Park, Kansas City.

THE ACTION OF DRUGS ON THE CARDIOVASCULAR MECHANISM OF THE PIG*

By L. H. SCHWARTE and H. H. DUKES

Department of Veterinary Investigation

Iowa State College, Ames, Iowa

During recent years great advances have been made in veterinary medicine resulting from the rapid development of the professional field and the exacting demands placed upon veterinarians. These conditions have made it urgent that physiological and pharmacological studies be conducted directly on the farm animals, so that we will not have to apply, as is now so often the case, the experimental results furnished by studies made on the dog, cat and other laboratory animals. A number of workers engaged in the various fields of the veterinary profession have expressed this opinion in their discussions of certain problems which have been investigated recently. Amadon,¹ in a recent paper, points out that experimental veterinary pharmacology has progressed very slowly, because of the lack of the fundamental physiological data pertaining to many of the domestic animal species, which constitute an essential prerequisite to any pharmacological study. As an outgrowth of our physiological studies on the cardiovascular mechanism of the pig, we were able to obtain considerable information on the action of certain drugs on this animal. The results are presented in this paper.

METHODS

The methods used in these studies are similar to those described in a previous paper² dealing with certain phases of the physiology of the cardiovascular mechanism of the pig. The anesthesia induced was either local or general. Apothesine and procaine were used in the former case; ether, chloroform and urethane in the latter. Ether and chloroform were administered by inhalation or by insufflation. Urethane was administered intraperitoneally. The other drugs were introduced into a cannulated femoral vein. Control intravenous injections of physiological salt solution were used between the injections of drugs. Such injections of saline also served to insure freedom from material remaining in the cannula following the previous injection. All

*Received for publication, October 2, 1930.

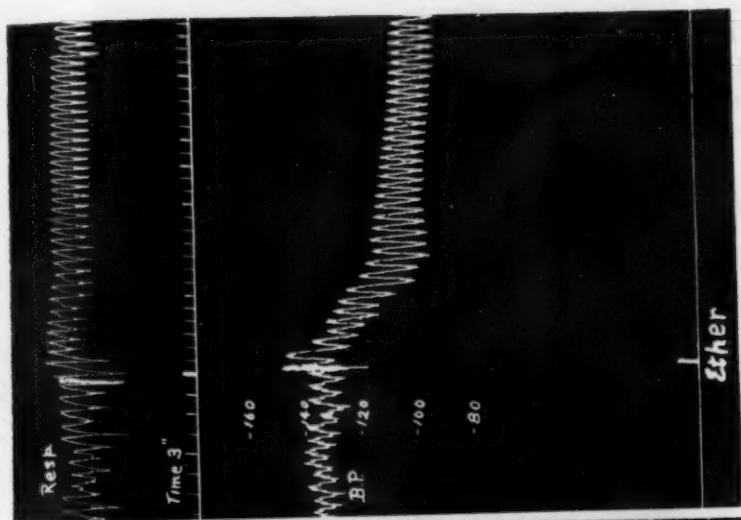


Fig. 2.

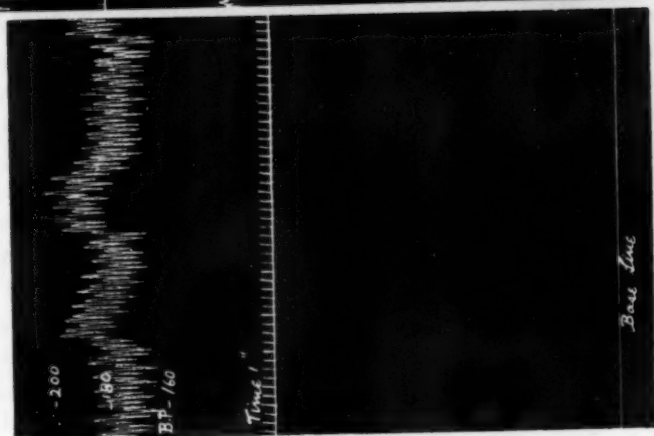


Fig. 1.

blood-pressure tracings and records were taken from a ligated carotid artery with either a mercury or membrane manometer as specified.

ANESTHETICS

Local anesthetics: In order to determine the effect of drugs on the blood pressure and the cardiovascular mechanism of the pig, it was necessary to acquire some data on the normal animal. Furthermore, it was necessary to study the effect of the various anesthetics used in these experiments upon the blood pressure and cardiac action.

In order to determine the true blood pressure, local anesthesia was used previous to the cannulation of the carotid artery and a blood-pressure tracing was then taken following the cannulation, thus avoiding the complications arising from general anesthesia. The local anesthetics used in these studies were apothesine (Parke, Davis and Company), containing 1/500 grain of adrenalin, in pig 10, and procaine (Swan-Myers Company) in all other experiments where local anesthetics were employed. Two per cent solutions were injected intradermally and subcutaneously in sufficient amounts to meet the requirements of the surgical operations necessary in cannulating the carotid artery. An intramuscular injection of 10 cc of 2 per cent apothesine showed no appreciable effect on blood pressure, and 2 cc of 2 per cent procaine intravenously resulted in a slight fall followed by a slight increase in blood pressure which was of little or no significance. We have every reason to believe that the blood-pressure records made under local anesthesia were uninfluenced by the anesthetic itself and represent the normal blood pressure in these animals. They therefore furnish a fundamental basis for the other pharmacological studies presented in this paper. Figure 1 shows a blood-pressure tracing obtained from a pig under local anesthesia.

Ether: The effect of ether on the cardiovascular mechanism of the pig is similar to its effect on that of laboratory animals. In the initial stages of ether anesthesia by inhalation, considerable excitation and struggling ensued which caused a rise in blood pressure as well as irregularity or inhibition of respiratory action. This period was followed by deep, regular respirations, slightly more rapid than normal, accompanied by a slight fall in blood pressure as the depth of anesthesia increased. In our later experiments we adopted the insufflation method of administration, and after considerable experience we were able to reduce

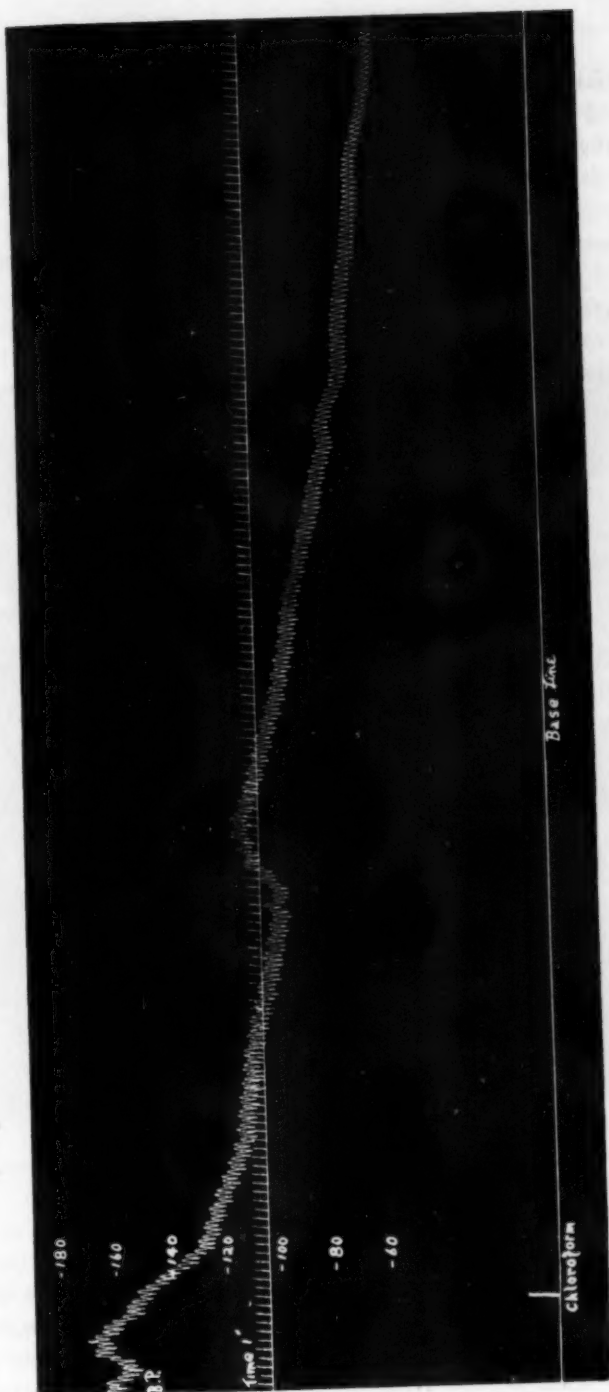


Fig. 3.

the initial stage of excitation to a minimum by injecting concentrated blasts of ether vapor into the tracheal cannula. By careful regulation of the ether-air mixture administered, a uniform anesthesia was obtained over a long period of time, which, from the experimental standpoint, is a decided advantage over the inhalation method. Figure 2 shows the effect of ether anesthesia on the blood pressure of the pig.

Chloroform: The few pigs on which chloroform alone was used as an anesthetic give us somewhat limited data on its action on the cardiovascular system of this animal. The preliminary effect of chloroform is similar to that of ether, but the heart action is depressed, and the progressive fall in blood pressure is decidedly greater than that caused by ether. Our experiments with chloroform as an anesthetic by the insufflation method were not very satisfactory. This may have been partly due to the fact that our insufflation apparatus was not well adapted to the use of chloroform; we had difficulty in getting a satisfactory chloroform-air mixture. A uniform blood pressure could not be maintained for an extended period of time; we experienced progressive declines and periodic falls which oftentimes necessitated the withdrawal of the anesthetic. We believe from our experience that chloroform has a similar influence on the cardiovascular mechanism of the pig as upon that of laboratory animals. Meyer and Gottlieb³ attribute the progressive decline in blood pressure during chloroform anesthesia to vasomotor paralysis and to a severe cardiac toxemia. The toxic action of chloroform on the heart is demonstrated by the frequent occurrence of irregularities in the heart action and by the fact that the heart oftentimes becomes paralyzed before the respiratory center is appreciably affected. Figure 3 shows the effect of chloroform anesthesia on the blood pressure of the pig.

Urethane: The dose of urethane used in this series of experiments was generally 1.5 gm. per kilogram of body weight. The crystals were dissolved in about 150 cc of warm distilled water, which solution was then gravitated intraperitoneally.

The effect of urethane on the cardiovascular mechanism of the pig apparently is strikingly different from its effect on that of other animals. We observed a decided fall of blood pressure in all pigs studied in this phase of the work. The absorption is evidently rapid, for the fall in blood pressure occurs quickly and a constant level is soon reached; the heart action is slightly retarded (fig. 4). In two pigs there were periods of respiratory

failure in which artificial respiration was imperative. This was probably due to a temporary paralysis of the respiratory center. Normal breathing was resumed after a short period of artificial respiration.

Having found evidence in the literature that urethane is without pronounced effect on the blood pressure of other species, we thought it advisable to repeat our technic on other animals for control purposes. We administered urethane intraperitoneally

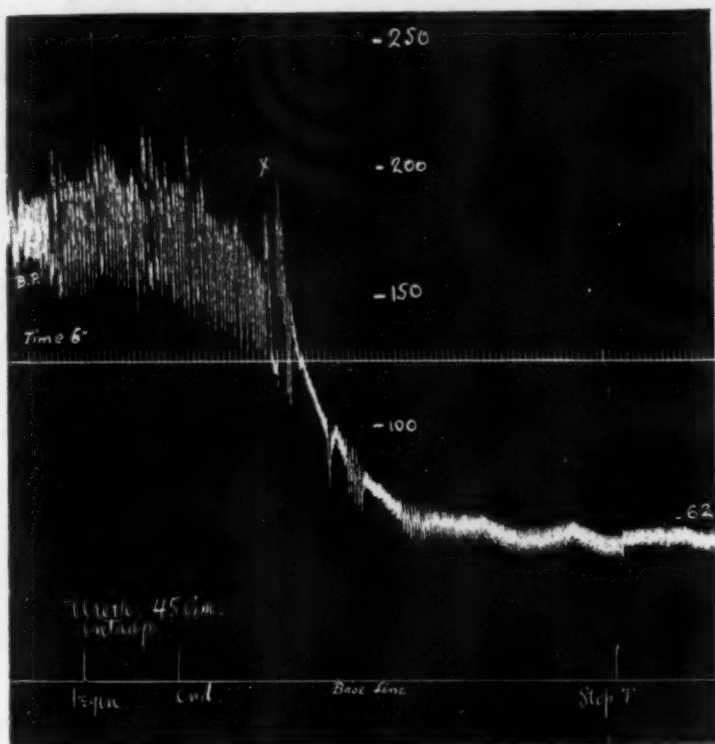


FIG. 4.

to a dog and a rabbit, using the same dose per kilogram of body weight as was used in the pigs. The fall in blood pressure was slight and at no time did it approach the level obtained in our experiments on pigs. It might be stated that we also experienced a respiratory failure in the dog which necessitated artificial respiration for a short period of time. Respiration was then resumed for the remainder of the experiment.

Pharmacologists also hold the view that urethane is without serious effect on the circulation. Meyer and Gottlieb³ cite Schmiedeberg, saying:

In animal experiments it (urethane) has proved to be an excellent anesthetic which hardly influences the cardiac activity at all, even in narcotic doses.

Sollman⁴ states that urethane has been disappointing in man, the hypnotic action is feeble and patients soon become immune; but it acts more satisfactorily in animals, producing a rapid and profound narcosis with little change in the circulation or respiration.

When given *intravenously* our experience with urethane in pigs leads us to believe that it may have a toxic action on the heart. We attempted to administer urethane in solution directly into the circulation in a pig weighing 31 kg. The blood pressure immediately fell, and death resulted before 15 grams had been injected. We are not in a position at the present time to explain this action.

Results: The quantitative influence of the above-mentioned anesthetics on blood pressure can best be presented in tabular form (table I).

TABLE I—Mean carotid blood pressure of pigs under anesthesia

ANESTHESIA	ANIMALS	AVERAGE WT. (KG.)	AVERAGES OF MEAN BLOOD PRESSURE (MM. HG)
Local	14	33	169 (150-185)*
Ether	10	34	121 (82-160)
Chloroform	2	37	112 (100-125)
Urethane	9	34	63 (42- 80)

*Figures in parentheses indicate extremes of mean carotid pressure.

Discussion: Through the use of local anesthetics we were able to produce perfect anesthesia over the operative area necessary for the cannulation of the carotid artery and thus to obtain normal blood-pressure tracings from the pig. The action of ether and chloroform on the cardiovascular system of the pig is not unlike their action on that of laboratory animals. Urethane has an effect apparently peculiar to the pig by which the blood pressure is reduced to a marked though, in these experiments, not a dangerous degree. Intravenously a small quantity produced the death of an animal. In general, our results with urethane intraperitoneally were highly satisfactory.



FIG. 5.

ALCOHOL

Small quantities of dilute ethyl alcohol (1 cc of 95 per cent alcohol in 4 cc of physiological salt solution) caused only a very slight increase in blood pressure and but a limited acceleration of the heart. One cubic centimeter of 95 per cent alcohol caused noticeable heart depression and a fall in blood pressure. Two cubic centimeters of 95 per cent alcohol produced a marked inhibition of the heart and a severe fall in blood pressure. This condition was transient and the normal blood pressure returned after a short period of time (fig. 5). Apparently large quantities of alcohol introduced into the circulation cause a depressing effect on the heart combined with a vasodilatation which results in a severe fall in the blood pressure of the pig. This action is similar to that experienced by other workers on laboratory animals. There is little evidence in our experiments to support the widespread belief that alcohol, when absorbed into the blood-stream, produces a stimulating effect on the cardiovascular system.

These alcohol experiments were conducted on pig 23.

ARECOLIN

Arecolin hydrobromid, in doses ranging from 1 to 5 mgm., was used on four different animals. In each instance there was a decided fall in blood pressure; this was accompanied by cardiac depression as shown by membrane manometer records. The fall in blood pressure varied from approximately 20 to 50 per cent. There was, however, only a slight correlation between the size of the dose and the magnitude of the fall in blood pressure. The action of arecolin on the pig is similar to its action on other animals. In doses of 4 and 5 mgm., increased salivation and pronounced muscular tremors were observed. Figure 6 illustrates a typical arecolin action on blood pressure.

ATROPIN

Five animals were used in this study, and doses of atropin sulfate ranging from 1 to 3 mgm. were administered. The rise in blood pressure varied greatly, ranging from 2 to 34 per cent, and with few exceptions it was preceded by a preliminary inhibition of the heart. This preliminary slowing has been observed in horses.⁵ Winslow⁶ states that large doses sometimes give rise to primary slowing of the pulse, owing to the stimulation of the inhibitory apparatus. Figure 7 illustrates the action of this drug.

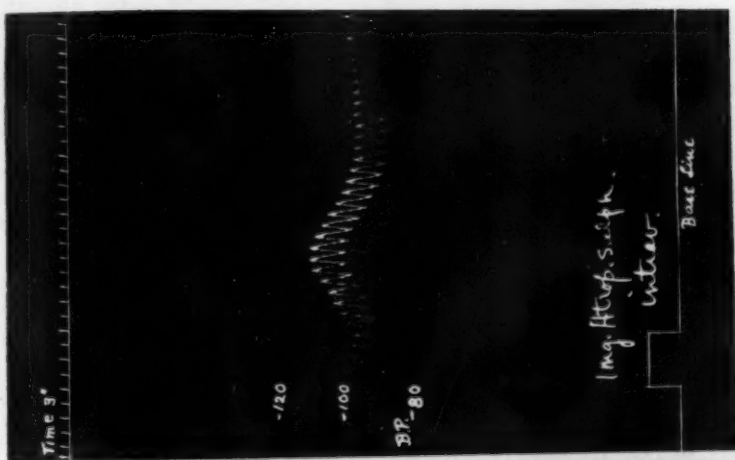


FIG. 7.

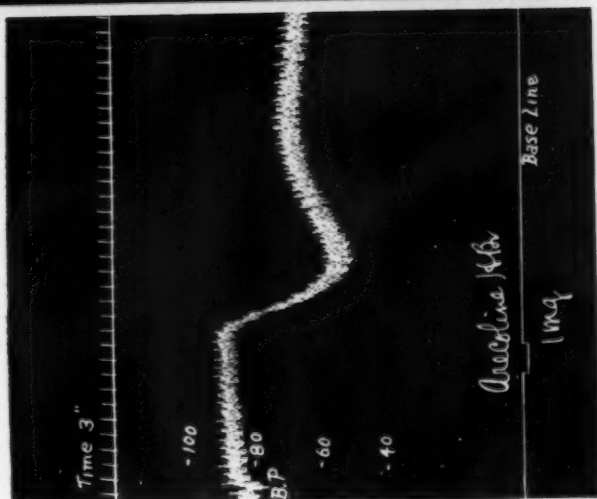


FIG. 6.

Several unsuccessful attempts were made to secure heart acceleration by the administration of 1- and 2-mgm. doses of atropin sulfate at the time of severe heart depression resulting from profound chloroform anesthesia.

In addition to the intravenous administration of atropin sulfate for the purpose of studying its effect on the blood pressure of the pig, we used subcutaneous injections of 1/50 grain in three pigs to determine the effect on the heart. The animals were secured on a suitable rack and allowed to remain undisturbed until the stage of excitation caused by handling had passed. The heart rate was determined before the drug was injected and at intervals following the injection. The results are summarized in table II. It will be noted that in two animals preliminary slowing of the heart resulted. In the third animal such slowing was not seen. In all cases distinct acceleration was noted.

TABLE II—*The effect of atropin sulfate (1/50 grain) on heart rate of the pig*

PIG	WEIGHT (Kg.)	AVERAGE HEART RATE BEFORE DRUG ADMINISTRATION	HEART RATE 5 MIN. AFTER DRUG ADMINISTRATION	MAXIMUM HEART RATE
11	49	146	120	203 (24)*
12	57	155	145	188 (23)
13	40	129	197	212 (8)

*Figures in parentheses indicate time in minutes elapsing between the administration of atropin and the maximum heart acceleration.

NITROGLYCERIN

Nitroglycerin was used several times on two pigs in doses varying from 0.65 to 2 mgm. The fall in blood pressure ranged from 23 to 70 per cent. The effect of the drug on the cardiovascular mechanism of the pig is similar to its effect on that of the dog. There was apparently some compensatory heart acceleration following the fall in blood pressure. The administration of 2 mgm. of the drug resulted in heart acceleration which was followed by a progressive inhibition and a somewhat weakened heart action, which is common in toxic doses. Figure 8 shows the effect of nitroglycerin.

PILOCARPIN

Pilocarpin hydrochlorid was administered in various ways to four pigs in doses ranging from 1 to 5 mgm. A 3-mgm. dose intramuscularly showed no appreciable effect. Five milligrams intraperitoneally resulted in a 9 per cent fall in blood pressure. Intravenous injections in doses varying from 1 to 4 mgm. caused

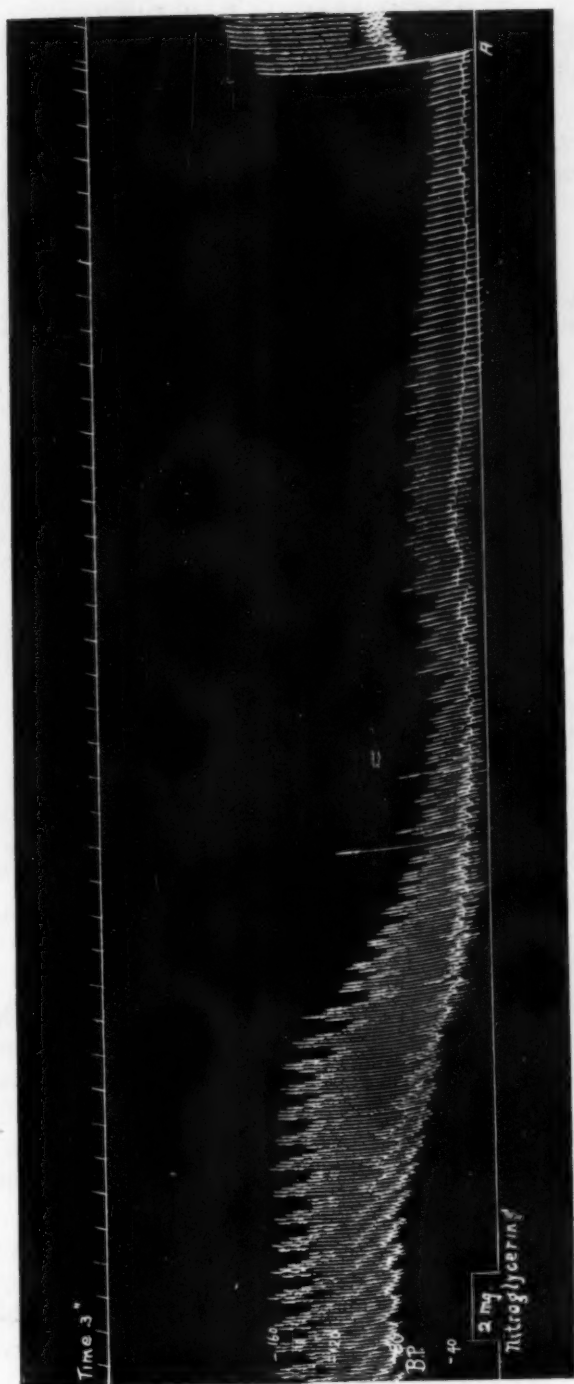


FIG. 8.

a fall in blood pressure of 18 to 38 per cent. The action of pilocarpin on pigs is similar to its action on laboratory animals in that heart depression is accompanied by a pronounced fall in blood pressure. Profuse salivation and muscular tremors follow the administration of the larger doses. Figure 9 illustrates the action of pilocarpin on blood pressure.

STRYCHNIN

Strychnin sulfate was administered in doses of 2 to 4 mgm. to two pigs. As in laboratory animals, strychnin produces a definite increase in the blood pressure of the pig. The increase as the result of 4-mgm. doses was between 18 and 20 per cent. Strychnin is reputed to be a powerful vasomotor stimulant, but judging from this somewhat limited experience in the pig, its action is not so great as is commonly believed. Figure 10 illustrates the action of strychnin.

SUMMARY

In a series of studies on the effect of drugs on the cardiovascular system of the pig it was shown that:

The average mean blood pressure under local anesthesia was 169 mm. Hg.

The average mean blood pressure under ether anesthesia (insufflation method) was 121 mm. Hg.

The average mean blood pressure under chloroform anesthesia (insufflation method) was 111 mm. Hg.

The average mean blood pressure under urethane anesthesia (1.5 gm. per kilogram of body weight intraperitoneally) was 63 mm. Hg.

Small doses of ethyl alcohol intravenously caused a slight increase in blood pressure and heart acceleration. Large doses caused severe heart depression and a pronounced fall in blood pressure.

Arecolin hydrobromid, in doses varying from 1 to 5 mgm., caused a decided fall in blood pressure following cardiac depression.

Atropin sulfate, in doses of 1 to 3 mgm., caused a rise in blood pressure and an acceleration of the heart. With few exceptions the latter effect was preceded by a preliminary cardiac inhibition.

Nitroglycerin in doses ranging from 0.65 to 2 mgm. caused a decided fall in blood pressure. In larger doses marked inhibition of the heart was recorded.

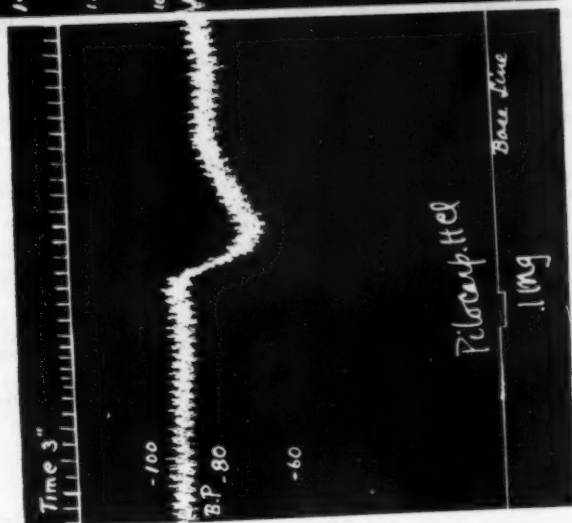


FIG. 9.

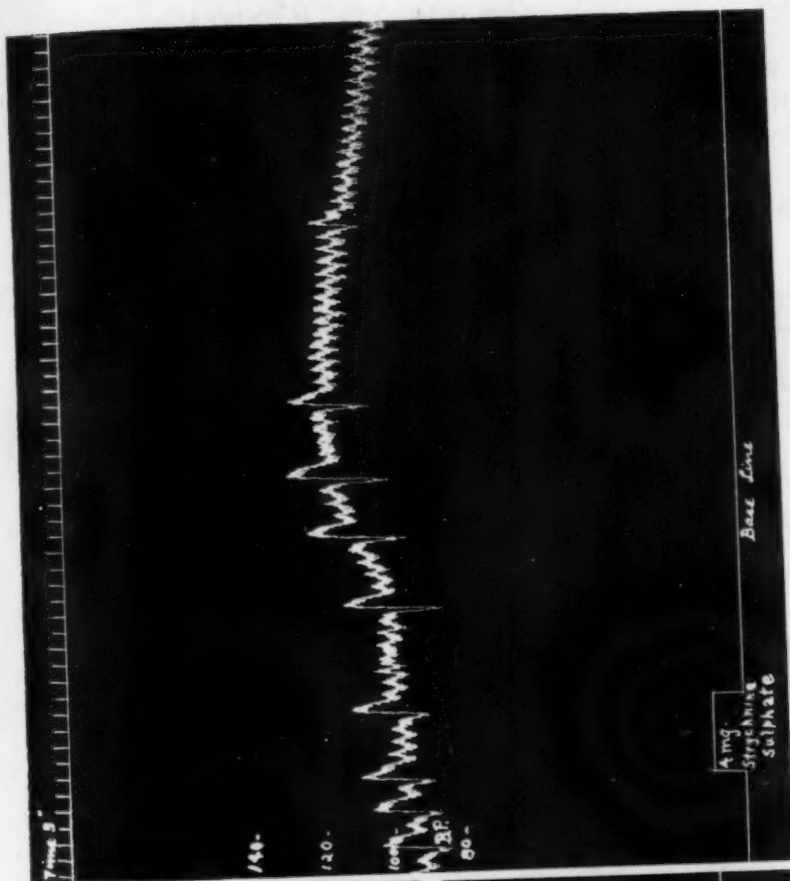


FIG. 10.

Pilocarpin hydrochlorid, administered in doses varying from 1 to 5 mgm., caused a marked fall in blood pressure accompanied by heart depression.

Strychnin sulfate, in doses ranging from 2 to 4 mgm., caused a definite rise in blood pressure.

REFERENCES

- ¹Amadon, R. S.: An experimental study of drugs stimulating the motility of the ruminant stomach. *Jour. A. V. M. A.*, lxxvi (1930), n. s. 29 (1), pp. 65-74.
²Dukes, H. H., and Schwarte, L. H.: The blood pressure of the pig and the influence of non-nervous and nervous factors on the cardiovascular apparatus. *Jour. A. V. M. A.*, lxxix (1931), n. s. 32 (1), pp. 37-62.
³Meyer, H. H., and Gottlieb, R.: *Experimental Pharmacology* (2nd ed., J. B. Lippincott Co., Philadelphia, London and Montreal, 1926).
⁴Sollman, T.: *A Manual of Pharmacology* (3rd ed., W. B. Saunders Co., Philadelphia and London, 1926).
⁵Covault, C. H.: Personal communication.
⁶Winslow, K.: *Veterinary Materia Medica and Therapeutics* (6th ed., William R. Jenkins Co., New York, 1909).

DESCRIPTIONS OF FIGURES

Figure 1. Blood pressure under local anesthesia (2 per cent procaine). 31-kg. pig. B. P., carotid blood pressure, Hg manometer.

Figure 2. Effect of ether anesthesia on blood pressure and respiration. 30-kg. pig. Resp., respirations; B. P., carotid blood pressure, Hg manometer. Ether by insufflation begun at signal. A local anesthetic was used prior to ether.

Figure 3. Effect of chloroform anesthesia on blood pressure. 33-kg. pig. B. P., carotid blood pressure, Hg manometer. Chloroform by insufflation begun at signal. Local anesthetic was used prior to chloroform.

Figure 4. Effect of urethane on blood pressure. 30-kg. pig. B. P., carotid blood pressure, Hg manometer. Intraperitoneal injection of urethane (1.5 gm. per kg.) begun and ended at signals. At the third signal, kymograph was stopped 7 minutes. A local anesthetic was used prior to urethane.

Figure 5. Effect of alcohol on blood pressure. 31-kg. pig. B. P., carotid blood pressure, Hg manometer. Intravenous injections of alcohol were made at signals. The first dose was diluted with 4 cc of saline; the other doses were undiluted.

Figure 6. Effect of arecolin on blood pressure. 31-kg. pig. Ether anesthesia. B. P., carotid blood pressure, Hg. manometer. Arecolin hydrobromid (1 mgm.) injected intravenously at signal.

Figure 7. Effect of atropin on blood pressure. 30-kg. pig. Ether anesthesia. B. P., carotid blood pressure, Hg manometer. Atropin sulfate (1 mgm.) injected intravenously at signal.

Figure 8. Effect of nitroglycerin on blood pressure and heart beat. 43-kg. pig. Ether anesthesia. B. P., carotid blood pressure, membrane manometer. Nitroglycerin (2 mgm.) injected intravenously at signal. A indicates a stop of 1 minute. Note marked inhibition of heart as well as drop in blood pressure.

Figure 9. Effect of pilocarpin on blood pressure. 31-kg. pig. Ether anesthesia. B. P., carotid blood pressure, Hg manometer. Pilocarpin hydrochlorid (1 mgm.) injected intravenously at signal.

Figure 10. Effect of strychnin on blood pressure. 43-kg. pig. Chloroform anesthesia. B. P., carotid blood pressure, Hg manometer. Strychnin sulfate (4 mgm.) injected intravenously at signal.

ON THE NERVOUS REGULATION OF RESPIRATION IN THE PIG*

By H. H. DUKES and L. H. SCHWARTE

*Department of Veterinary Investigation, Iowa State College
Ames, Iowa*

During a study of blood pressure and of cardiovascular responses in the pig,^{1,2} it was possible to make a limited number of observations on the nervous regulation of respiration. Since, as far as we know, no work of this kind has ever been reported for the pig, a record of our results seems warranted.

METHODS AND MATERIALS

The graphic method was used throughout this study. The respiratory tracings were recorded with an air tambour writing on the smoked paper of a kymograph. The receiving end of the respiration-recording system was either a pneumograph tied around the thorax or a hypodermic needle inserted into the trachea. Connection with the tambour was established through rubber tubing containing air. Simultaneous blood-pressure records were made from a ligated carotid artery.

The nerves whose influence on respiration was to be studied were isolated and divided. Then the central end of the nerve was stimulated with the electric current furnished by a Stoelting inductorium with two dry cells in the primary circuit. The voltage of this circuit was about 2.8. The distance in centimeters between the primary and secondary coils was recorded.

The anesthetic used was either urethane or ether. In presenting the experimental results, the kind of anesthetic employed will be mentioned.

Sixteen pigs were included in this study. Their distribution by breed was: Tamworth, 11; Duroc Jersey, 2; Poland China, 2; unrecorded, 1; by sex: castrated males, 11; male, 1; females, 5. The average weight of the pigs was 34 kg.; the range of weight was 23 kg. Seventy-five per cent of the weights fell between 30 and 40 kg., inclusive.

Practically all of the pigs were undersized, although most of them were healthy. Two were in fair condition only, and one had chronic pleurisy and pericarditis but was otherwise in good condition. No animal was suffering from any acute disease. In

*Received for publication, October 2, 1930.

fact, we know of nothing in the state of health of any pig that significantly modified its response to the experimental conditions imposed.

RESULTS

Tightly tying the vagus nerve: The vagus nerves bear a special reflex relation to the respiratory center. By the passage of tonic afferent impulses to the center, they keep the rate of respiration faster and the amplitude shallower than would be the case if the vagi did not exist. The usual effect, therefore, of severing the vagi in the neck is to cause the respirations to become deeper and slower; severing one nerve may cause an intermediate effect.

Our results in the pig were far from constant. Tying one vagus nerve and then the other, in several animals, gave a variety of results, which are summarized in table I. All ligations were tight and were therefore equivalent to severing the nerve.

TABLE I—*Effect of tightly tying cervical vagus nerve on respiration*

ANIMAL	ANESTHETIC	LIGATION OF LEFT VAGUS	LIGATION OF RIGHT VAGUS
1	Ether	Negative (1)*	Slower and deeper (2)
2	Urethane	Deeper (1)	Negative (2)
4	Ether		Faster
6	Urethane	Slower (1)	Negative (2)
7	Urethane	Shallower for one move- ment (2)	Negative (1)
9	Urethane	Slower (2)	Faster (1)

*The order in which the two nerves were tied is indicated in parentheses after the result.

Stimulation of central end of vagus: When the central end of a vagus nerve is stimulated, the respiratory rate or amplitude, or both, may be affected. Either may be increased or decreased, the other being affected in the same way, in an inverse way or not at all. It is therefore evident that many types of responses are possible.

Stimulation of the central end of the vagus, both right and left, in a number of animals, gave the results summarized in tables II and III. In table II the coil-distance was 10 cm.; in table III it was variable. The anesthetic used was ether or urethane. The kind of response seemed to bear no relation to the kind of anesthetic. It is evident from the tables that the prevailing response is complete inhibition of respiration. The tendency of the left nerve to cause this effect is clearly greater than the tendency of the right nerve.

Stimulation of central end of sciatic nerve: When the central end of any sensory nerve is stimulated, respiration may be affected in a variety of ways. To study the effect of afferent stimulation (other than of the vagi, which nerves bear a special relation to the respiratory center) the sciatic nerve was selected. Its central end was stimulated several times in a number of pigs and the effect on respiration was recorded. The results at coil-distances of 10 cm. may be presented in the following summary (the figures indicate the number of animals giving the response):

Faster, 1; slower and shallower, 1; slower with enlargement of thorax, 1; complete inhibition, 1; negative, 3.

TABLE II—*Effect of stimulation of central end of vagus nerve on respiration (coil-distance 10 cm.)*

	NUMBER OF STIMULATIONS CAUSING—			NUMBER OF ANIMALS STUDIED
	COMPLETE INHIBITION	DECREASED AMPLITUDE	OTHER EFFECTS	
Right vagus	7	3	4	10
Left vagus	10	1		9

TABLE III—*Effect of stimulation of central end of vagus nerve on respiration (coil-distance variable)*

	NUMBER OF STIMULATIONS CAUSING—					NUMBER OF ANIMALS STUDIED
	COMPLETE INHIBITION	DECREASED AMPLITUDE	NEGATIVE EFFECT	INCREASED RATE	OTHER EFFECTS	
Right vagus	9	6	2	2	1	10
Left vagus	16	2	1		2	8

The results at other coil-distances are shown in the following summary; the number of animals was 6, the figures indicate the number of stimulations giving the response:

Complete inhibition, 3; slower and shallower, 2; thorax enlarged, 4; slower and thorax enlarged, 1; slower, 1; negative, 5.

Urethane anesthesia was induced in most of the animals, ether anesthesia in the others.

Ligation of both carotid arteries: In several pigs ligation of both carotid arteries (one and then the other) caused little or no evident effect on respiration.

SUMMARY

Some preliminary studies on the nervous regulation of respiration in the pig are reported.

Tightly tying the vagus nerves gave inconstant results. No general conclusion can be drawn.

Stimulation of the central end of the vagus nerve gave a variety of results, but complete inhibition of respiration was the prevailing response, especially with the left nerve.

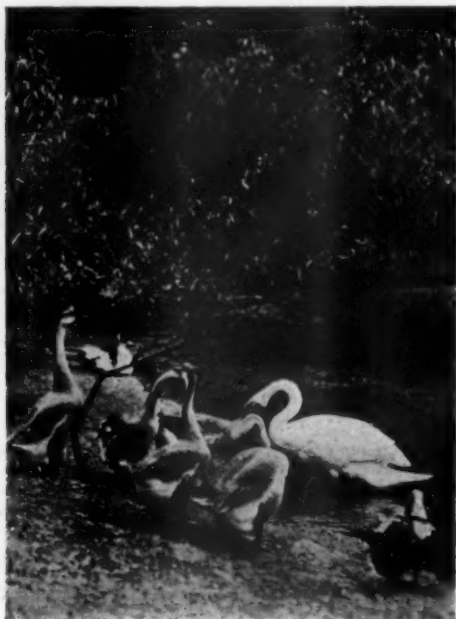
Stimulation of the central end of the sciatic nerve also gave many kinds of responses. Negative effects were not uncommon.

Ligation of both carotid arteries caused little or no apparent effect on respiration.

REFERENCES

¹Dukes, H. H., and Schwarte, L. H.: The blood pressure of the pig and the influence of nervous and non-nervous factors on the cardiovascular apparatus. *Jour. A. V. M. A.*, lxxix (1931), n. s. 32 (1), pp. 37-62.

²Schwarte, L. H., and Dukes, H. H.: The action of drugs on the cardiovascular mechanism of the pig. *Jour. A. V. M. A.*, lxxix (1931), n. s. 32 (2), pp. 180-194.



Swan and geese in Swope Park, Kansas City.

STUDIES OF THE FISH-BORNE TAPEWORM *DIBOTHRIUM CORDICEPS LEIDY**

By B. T. SIMMS and J. N. SHAW, *Corvallis, Oregon*

*Department of Veterinary Medicine, Oregon State Agricultural
College Experiment Station*

INTRODUCTION

During the late summer of 1929, rather heavy losses, said to be the result of tapeworm infestation, occurred among the trout in Elk Lake in western Deschutes County, Oregon. At the request of Mr. M. L. Ryckman, Superintendent of Hatcheries of the Oregon State Game Commission, some investigations of these losses were undertaken. Studies to date have included the establishment of fish hosts of this tapeworm and its pathogenicity for such hosts, its identification, its distribution, and a limited number of both feeding experiments and field observations to determine possible hosts of the mature tapeworm. Two field trips to the affected area have been made. Drs. Maurice C. Hall and E. B. Cram,† both of the Zoölogical Division, U. S. Bureau of Animal Industry, accompanied one of the authors (B.T.S.) on the first trip in September, 1929. The second trip was by the authors in September, 1930. From time to time, fish from the area have been forwarded to the authors for examination.

FISH HOSTS AND PATHOGENICITY

At the time of the first visit, both sick and dead brook trout (*Salvelinus fontinalis*) were present in considerable numbers along the shores of Elk Lake. Examination of such fish resulted in finding tapeworm larvae in the peritoneal cavity of every specimen autopsied. They were not found in any other portion of the fish. Some were imbedded in the walls of the stomach, some encysted among the branches of the pyloric ceca, and some were crawling free on the peritoneal surfaces. Some of the encysted parasites were surrounded by inflammatory zones, while others were imbedded in necrotic masses. Peritonitis was observed in every sick or dead fish examined. This was, in many cases, accompanied by ascites. There was evidently some

*Received for publication, January 31, 1931.

†The authors wish to express their appreciation of the very material assistance which was given by Drs. Hall and Cram.

correlation between the number of parasites present and the severity of the peritonitis.

The number in each of these fish varied from about a dozen to more than 50 parasites. Apparently healthy trout, caught from this lake at this time, were only slightly parasitized, the numbers of tapes in each fish varying from three or four to about a dozen. Most of these trout were affected with a mild peritonitis.

Trout of all sizes from fingerlings to about fifteen inches in length were found infested. Very few dead fingerlings were seen along the shores.

Reports from the local game warden indicated that the losses in this lake stopped about October 1, 1929, but five out of seven fish from this source which were sent to the laboratory, November 4, were parasitized (table I).

Trout from this lake were received at the laboratory, May 24, 1930, and August 21, 1930. Both groups were parasitized but not so heavily as were those examined the previous year. The game warden reported no losses occurring when these fish were collected.

Six brook trout and one silver salmon (*Onchorynchus kisutch*) were received from South Twin Lake, July 9, 1930. The salmon was very heavily parasitized and exhibited a severe peritonitis. The trout were moderately infested. The game warden reported that some losses were occurring in this lake.

Only four dead trout, three of which were fingerlings, were found on the second trip to Elk Lake in September, 1930. Again the dead fish were severely parasitized and exhibited rather severe peritonitis, while the apparently healthy fish which were caught from the lake contained fewer tapeworms and showed only very slight localized peritonitis.

IDENTIFICATION

The larvae varied from less than one to more than five centimeters in length. They moved vigorously when placed in cool water. Dr. Hall made a tentative identification as *Dibothrium cordiceps* Leidy 1871. Miss M. F. Jones,* of the Zoölogical Division, U. S. Bureau of Animal Industry, compared specimens with some of the specimens collected by Linton¹ and corroborated Dr. Hall's identification. This tapeworm was first found in Yellowstone Lake and the Upper Yellowstone River by the

*The authors are indebted to Miss Jones for the identification of specimens.

Hayden Survey.² Leidy³ described these parasites as a new species, naming it *Dibothrium cordiceps*. Jordan⁴ obtained larvae from trout from Yellowstone Lake and Heart Lake in Yellowstone National Park and from the Yellowstone River near Livingston, Montana. Linton¹ collected adult specimens from the pelican and larvae from Yellowstone trout. Both Jordan and Linton reported the infested trout as being *Salmo mykiss*.

DISTRIBUTION

Parasitized fish were obtained from Elk Lake, South Twin Lake, and East Lake, while limited numbers of fish examined from Paulina Lake and the Deschutes River at Crane Prairie were not found to be parasitized (table I).

TABLE I—Examinations of fish

DATE	ORIGIN	SPECIES	SIZE (IN.)	EXAM-INED	INFESTED		REMARKS
					No.	%	
9-11-29	Elk Lake	Brook trout	2-14	More than 12	All	100	Fish dying
9-11-29	Deschutes River at Crane Prairie	Rainbow trout	12-14		0	0	No losses occurring
11-4-29	Elk Lake	Brook trout	10-13	7	5	71	No losses occurring
5-24-30	Elk Lake	Brook trout	11-13	4	3	75	No losses occurring
7-9-30	South Twin Lake	Brook trout	8-12	6	6	100	Fish dying
7-9-30	South Twin Lake	Silver salmon	13	1	1	100	Fish dying
8-21-30	Elk Lake	Brook trout	9-13	6	5	83	No losses occurring
9-9-30	Elk Lake	Brook trout	8-15	7	7	100	Very few fish dying
9-9-30	Elk Lake	Brook trout	2¾-3½	7	3	43	Very few fish dying
9-9-30	Deschutes River at Crane Prairie	Rainbow trout	8-16	8	0	0	No losses occurring
9-10-30	Paulina Lake	Brook trout	10-12	4	0	0	No losses occurring
9-10-30	Paulina Lake	Rainbow trout	15 & 18	2	0	0	No losses occurring
9-10-30	Paulina Lake	Silver salmon	15	1	0	0	No losses occurring
9-10-30	East Lake	Brook trout	10-16	6	1	16	No losses occurring
9-10-30	East Lake	Silver salmon	20	1	0	0	No losses occurring

These lakes vary from 4600 (Elk Lake) to 6600 feet (East Lake) above sea level. They are located in an open pine forest area

with either coarse sand or rock bottoms. Their waters are clear and quite cold. They vary in size from about two to several miles in diameter. They have been considered very satisfactory for rearing game fish. The Oregon State Game Commission has stocked these lakes with brook trout, rainbow trout (*Salmo iridiens*), and silver salmon, and thousands of fish have been taken on hooks from their waters.

HOSTS OF THE MATURE PARASITES

At the time of the first visit to Elk Lake (September, 1929), the innkeeper at this lake advised that gulls were the only fish-eating birds which had frequented the lake in considerable numbers in 1929. Prior to 1928, he said, there had been very few gulls seen around the lake but that year there was a marked increase in their numbers, with another such increase in 1929 over 1928. According to him, no carnivorous mammals were feeding on the fish in Elk Lake.

Following this visit it was suggested to the Oregon State Game Commission that all dead fish and fish offal originating in this lake be either burned or buried, and that attempts be made to keep fish-eating birds away from the lake.

TABLE II—Feeding experiments

ANIMAL FED		DATE (1929)	LARVAE FED	RESULTS
No.	SPECIES			
1	Dog	9-12	10	No tapes found on autopsy, 10-30-29
2	Duck	9-12	4	No tapes on autopsy, October, 1929
3	Duck	9-12	10	No tapes on autopsy, October, 1929
4	Raccoon (<i>Procyon lotor</i>)	9-16	Parasitized fish <i>ad lib.</i>	Weekly examinations of feces for tapeworm eggs until 1-25-30 negative
5	Gull (<i>Larus occidentalis</i>)	9-16	Parasitized fish <i>ad lib.</i>	No tapes of this species found at autopsy, 10-2-29
6	Raccoon (<i>Procyon lotor pacifera</i>)	11-6	6	Biweekly examinations of feces for tapeworm eggs until 3-1-30 negative.
7	House cat	11-6	6	Biweekly examinations of feces for tapeworm eggs until 3-1-30 negative.
8	Duck	11-6	6	No tapeworms found on autopsy, 1-7-30
9	Gull	11-7	6	Two specimens <i>Dibothrium cordiceps</i> found attached to wall of small intestine on autopsy, 11-14-29
10	Gull	11-7	5	No tapeworms of this species found on autopsy, 12-17-29

FEEDING EXPERIMENTS

At the time of this visit, material was collected and taken back to the laboratory for feeding experiments. Living larvae were fed to one dog, two ducks, one raccoon (*Procyon lotor*) and one gull (*Larus occidentalis*). Larvae which were obtained from material at a later date were fed to one raccoon (*P. lotor pacifera*), one house cat, one duck and two additional gulls (table II).

Two developing tapeworms were found attached to the mucosa of the jejunum of one of the birds (gull 9, table II). They were identified by Miss M. F. Jones as *Dibothrium cordiceps* Leidy. No evidence of infestation was found in any of the other animals.

At the time of the second visit to Elk Lake and vicinity, in September, 1930, nine fish-eating birds were killed and examined for these parasites with negative results (table III).

TABLE III—Field examinations of birds (9-9-30)

ORIGIN	SPECIES	NUMBER EXAMINED	RESULTS
Sparks Lake	Gulls (<i>Larus californicus</i>)	2	Negative
Elk Lake	Gulls (<i>Larus californicus</i>)	2	Negative
Deschutes River at Crane Prairie	Gulls (<i>Larus californicus</i>)	1	Negative
	Bald eagle (<i>Haliaeetus leucocephalus</i>)	1	Negative
	Mergansers (<i>Merganser americanus</i>)	2	Negative
	Pelican (<i>Pelecanus erythrorhynchos</i>)	1	Negative

DISCUSSION

Since closely related tapeworms spend the first or proceroid stage of their lives in copepods, these small fresh water crustacea would naturally come under suspicion as hosts of this tapeworm. No attempts have been made to establish such hosts, but unidentified crustacea have been found in the stomachs of parasitized trout.

Both Hayden² and Linton¹ reported finding some parasites in the muscle tissues of infested fish from Yellowstone Lake but Linton failed to find them in the muscles of parasitized fish from Heart Lake. Both these collectors reported some specimens considerably larger than the largest which have been collected in Oregon. Since the parasites found in Elk Lake in 1930 were approximately the same size as those collected at the same place a year previously, it does not seem probable that this difference

in size was due to the age factor alone. Perhaps the larvae develop to larger sizes in mountain or cutthroat trout than in brook trout or silver salmon.

The very limited number of examinations of rainbow trout with negative results does not indicate that this fish cannot act as a host of the parasite.

The addition of two genera, *Salvelinus* and *Onchorychus*, to the one, *Salmo*, already established for the immature form of this tapeworm, suggests the possibility that all genera and species of the family Salmonidae may act as carriers of this parasite. The establishment of the gull as an additional host of the mature worm indicates the probability of other fish-eating birds acting as carriers. The apparent protean nature of this tape may result in its becoming a very widespread and serious parasite of game fish.

The three lakes from which infested fish have been taken are very similar to many others in both the Oregon and Washington Cascade Mountains. There are hundreds of these lakes which are stocked with cutthroat, brook, or rainbow trout or silver salmon. The fish-eating birds which occur around the known infested lakes are quite probably to be found over the entire area. It seems probable, therefore, that other lakes either are already infested or will become so.

The attempts at keeping gulls away from Elk Lake may have resulted directly in the decrease in the severity of the infestation between September, 1929, and September, 1930. This procedure did not give full protection, however, as infested fingerlings were found in this lake in September, 1930.

The recommendations of the Oregon State Game Commission that all fish offal be either burned or buried are evidently of some value in preventing the infestation of gulls which would otherwise eat such waste.

The established policy of complete protection of many of the fish-eating birds must be carefully considered in making plans for controlling this and possibly other parasites. Modifications of existing protection may be desirable in some areas and under some conditions.

SUMMARY

1. Two new fish hosts, brook trout and silver salmon, have been established for the larval forms of the bothriocephalid tapeworm, *Dibothrium cordiceps* Leidy.

2. Evidence, indicating its pathogenicity for these two fish hosts, has been obtained.

3. The gull has been established as a new host for the mature parasite.

REFERENCES

- ¹Linton, Edw.: A contribution to the life history of *Dibothrium cordiceps* Leidy. Bul. U. S. Fish Commission, 1889, ix (1891), pp. 337-358.
²Hayden, F. V.: Preliminary report of the U. S. Geological Survey of Montana and portions of adjacent territories. Fifth Ann. Rpt. Progress (1871), p. 97.
³Leidy, J.: Ibid. pp. 381-392.
⁴Jordan, D. S.: Reconnaissance of the streams and lakes of the Yellowstone National Park. Bul. U. S. Fish Commission 1889, ix (1891), pp. 41-62.

PUBLICATIONS RECEIVED

- National Research Council, Report of the. Reprint from *Ann. Rpt. Nat. Academy Sci.*, July 1, 1929-June 30, 1930, pp. 119.
 National Research Council, Organization and Members, 1930-1931. Washington, D. C., 1930. pp. 66.
 A Study of the Effect of Acriflavine Given Intravenously on Experimental Uterine Infection in the Dog. Joseph L. Meyer. Reprint from *Amer. Jour. Obst. & Gynec.*, xx (1930), 6, p. 760.
 Colony and Protectorate of Kenya, Agricultural Census 1930, Eleventh Annual Report. Dept. of Agr., Nairobi, Kenya, 1930. pp. 65.
 Summary of Report on Pasture Investigation in Kenya, 1926-1929. H. Gunn. (Bul. 5. Colony and Protectorate of Kenya Dept. of Agr., Nairobi, Kenya, 1931.) pp. 25.
 Southern Rhodesia, Report of the Director of Veterinary Research, for the Year 1930. Salisbury, Rhodesia, 1931. pp. 13.
 New Jersey, Department of Agriculture, Chapter 28, Laws of 1931, State of. Trenton, N. J., 1931. pp. 8.
 Observations on Ticks and Tick-borne Diseases. E. Aneurin Lewis. (Bul. 2. Colony and Protectorate of Kenya Dept. of Agr., Nairobi, Kenya, 1931.) Illustrated. pp. 15.
 The Relations of Human and Veterinary Medicine. Maurice C. Hall. Reprint from *Va. Med. Monthly* (May, 1931).
 Nutrient Requirements for Normal Growth of Dairy Cattle. C. H. Eckles and T. W. Gullickson. Reprint from *Jour. Agr. Res.*, xlii (1931), 9, pp. 603-616.
 Nutrients Used for Maintenance by Growing Dairy Cattle. T. W. Gullickson and C. H. Eckles. Reprint from *Jour. Agr. Res.*, xlii (1931), 9, pp. 593-601.
 Warts on Cattle. G. T. Creech. (Leaflet 75. U. S. Dept. Agr., Washington, D. C., May, 1931.) Illustrated. pp. 4.
 Ontario Veterinary College, 1930, Report of the. Ont. Dept. Agr., Toronto, Ont., 1931. pp. 88.
 Ontario Veterinary College, Session 1931-1932, Calendar of the. Guelph, Ont. pp. 48.
 Isolation of *Brucella Abortus* from a Human Fetus. Charles M. Carpenter and Ruth Boak. Reprint from *Jour. Amer. Med. Asso.*, xcvi (1931), pp. 1212-1216.
 Treatment of Undulant Fever with an Autogenous Antigen. G. S. Schilling, C. F. Magee and F. M. Leitch. Reprint from *Jour. Amer. Med. Asso.*, xcvi (1931), pp. 1945-1948.
 Iowa State College of Agriculture and Mechanic Arts Official Publication. Announcements, 1931-1932, Veterinary Medicine. Ames, Iowa, March 25, 1931. pp. 58.

MILK IN THE FEEDING OF POULTS*

By R. LEARMONTH,† *Kingston, R. I.*

Rhode Island Agricultural Experiment Station

INTRODUCTION

The following results have been obtained from work started originally to investigate entero-hepatitis (blackhead) in turkeys.

When the poults under observation were ready to be moved to an outside brooder-house, the difference in size and the mortality rate of those poults that had been receiving the increased dried milk ration was very noticeable.

The observations to have been made on blackhead were the effects of the increase or addition of certain constituents in a complete dry mash mixture for possible prevention of this disease. The constituents increased were the charcoal, which was increased to 30 per cent, and dried skimmed milk to 30 per cent. The constituent added was canned tomatoes—one part of which was mixed with three parts of mash. One pen received the regular mash mixture without any increase or addition, acting as controls.

MATERIAL

There were two lots of poults, 33 of which were hatched July 3 and were 63 days of age when last weighed, representing the tenth setting of eggs for the season. The second lot numbered 46 poults, hatched August 5 and were 51 days old at the second and last weighing. These represented the eleventh setting.

The poults were taken directly from the incubator and placed in an electric brooder, where they remained until they were 48 and 35 days of age respectively and then moved to a brooding-coop until they were ten weeks of age, being moved from here to the open range.

The mash mixture used for the experiment was:

Corn meal.....	200 lbs.
Wheat middlings.....	100 lbs.
Wheat bran.....	100 lbs.
Rolled oats.....	100 lbs.
Meat meal.....	25 lbs.
Fish meal.....	25 lbs.
Cod-liver oil.....	1 pint to 50 lbs.
Dried milk.....	50 lbs.

*Received for publication, March 2, 1931.

†Resigned.

Calcium carbonate.....	15 lbs.
Steamed bone meal.....	25 lbs.
Alfalfa leaf meal.....	25 lbs.
Salt.....	8 lbs.
Charcoal.....	15 lbs.

This mash mixture can be considered fairly representative of the complete mash rations commonly used today.

The percentage of hatch of the two settings was 33 and 37 respectively, the eggs being from one to eight days of age and having been held at a temperature of 65° F.

TABLE I—*Experimental data*

CONTROLS			CHARCOAL (30%)			MILK (30%)			TOMATOES (1-3)		
BIRD	WEIGHT		BIRD	WEIGHT		BIRD	WEIGHT		BIRD	WEIGHT	
	ST'RT	FIN-ISH		START	FIN-ISH		START	FIN-ISH		START	FIN-ISH
C113	63	602	C112	51		C116	51	850	C117	55	602
C115	50	592	C110	48		C111	40	752	C109	51	
C114	44	590	A321	42	480	A314	46	650	A317	46	600
A306	44		A301	46		A302	58		A320	40	
A318	52	483	A313	50		A298	52	800	A310	50	476
A319	48		A315	44		A304	50	550	A309	46	596
			A311	44		A302	50		A308	52	
			A316	54		A303	44	554	A319	48	
			A307	46		A305	46	652	A300	52	500
B 52	56		A337	50	300	A338	44		A332	52	
A334	54	284	A346	52		A343	52	325	A330	48	275
A331	60		A339	50		A345	60	410	A326	56	
A336	54		A347	56		A324	60		A354	52	
C123	46	210	A322	48		A327	48	330	A342	54	
C124	46		A340	52		A323	48		A339	48	
C121	54		A341	56	280	A348	62		A333	50	
			A335	54		A328	50	472	A325	54	
			C119	48		C118	60		A349	58	
			C112	48		C120	56	475	B 51	58	
			B 56	50		C127	48		B 53	48	
			B 57	48		B 54	48		C125	48	210
			C128	46	205	B 55	46		C126	56	
Tot'l	681	2761		1083	1265		1119	6820		1132	3259
Avg.	52.4	460.2		49.2	316.3		50.9	568.3		51.5	465.6
Mortality (%)	53.8		81.8			45.5			68.2		

DISCUSSION

Considerable work has been done with dried milk in the feeding of baby chicks but very little mention is made in the literature of its value or practicability in feeding poults. Whether this dried milk in the same amount or to a lesser or greater amount

has the same benefit for baby poults as it has for baby chicks has never been definitely shown. There is even doubt in the minds of some turkey feeders as to whether the ordinary mash mixtures for chicks, as a whole, are proper feed mixtures for baby poults, simply because they are considered proper for baby chicks.

In feeding experiments with baby chicks, milk as a food, due to its high protein, vitamin, mineral, and lactose or milk sugar content, has been proven very valuable.

There have been two popular opinions developed recently in turkey feeding, both looked on with much favor by turkey-raisers. One is the increase of vitamin B and the other is an increase in protein content, both of animal and vegetable origin.

The amount of dried milk used has depended somewhat on the other ingredients in the different mash mixtures, and has varied considerably as to the amounts used by different poultrymen. The variation ranges from $2\frac{1}{2}$ to 24 per cent under normal conditions, and as high as 40 per cent when coccidiosis is present.

The content of the dried milk in the above ration being 30 per cent does not necessarily mean that a smaller percentage might not have proved just as beneficial. Thirty per cent was used as an approximation between the 24 and 40 per cent increases mentioned.

From table 1, it will be noticed that the average weight at the first weighing is quite uniform. The average weights from the last weighing vary considerably, particularly in the lot receiving the increase in dried milk. The weights of the lots receiving the tomato mash and the regular mash were fairly close together. The lot which received the increased charcoal showed the poorest.

The mortality as a whole was quite high. This, however, adds to the interest of the results as it increases the value of the dried milk when the conditions causing the mortality are understood. The mortality is represented on the chart by the birds showing no weight at the finish.

The high mortality was brought about by a number of conditions. The breeding stock was worn out. The hatching season was quite late. The weather for incubating was very hot throughout the day and the brooding period had many chilly nights. The poults were also subjected to considerable excitement and confusion.

In passing, it might be of interest to explain the difference between the A, B and C poults. The A poults were one genera-

tion more inbred than the B and C poults, these latter having been inbred twice.

All dead poults were carefully examined but no parasites or abnormal conditions other than unabsorbed egg yolks were found. Particular care was exercised here. Three poults on the increased charcoal ration did show signs of slipping tendons toward the last.

The cause of the difference in the percentage of mortality between the control poults and those on the tomato diet was not determined, unless it was due to the fact that this lot was closer to the aisle through which much traffic passed, and can be laid to undue excitement and crowding. The high mortality and poor condition of the poults receiving the increased charcoal was due, no doubt, to the unpalatability of and lack of nourishment in the mash after the high increase of charcoal.

The condition and mortality rate of the poults, on diets other than the milk and the control mash, is of slight importance, as the comparison between the regular or control mash and the increased milk mash is the main object of these results.

The brooding of the poults both in the electric brooder and in the brooding-coop was carried on within doors, cod-liver oil in the mash substituting for sunlight.

SUMMARY

1. The addition of 30 per cent of dry skimmed milk, in a representative mash mixture for chicks, fed to poults under ten weeks of age, does not appear detrimental.

2. This same 30 per cent increase does appear to increase growth and vitality.

3. Growing poults must have a diet as nourishing as the average dried mash.

4. The value of dry skimmed milk, whether due to its protein, vitamin, mineral, or milk sugar content, has not been determined.

5. Young growing stock requires protein. The greatest protein increase is due to animal protein, as vegetable protein sources also furnish carbohydrate food not so necessary to growing stock. The vegetable protein and carbohydrate grains also are rich in vitamin B. Milk contains animal protein. Animal proteins (meat and fish meal) contain no vitamin B.

6. It appears reasonable then to say that the value from dried skim milk was due more to the increase of protein than the increase of vitamin B. Therefore, a mash mixture high in animal protein seems to be indicated for the feeding of growing poults.

A NEW TREATMENT FOR OESTRUS OVIS LARVAE IN THE HEAD OF SHEEP*

By E. M. GILDOW and C. W. HICKMAN

University of Idaho, Moscow, Idaho

This preliminary report on a new treatment for *Oestrus ovis* in sheep and goats will consist largely in a discussion of the drug used and the method of application.

According to Hutyrá and Marek,¹ *Oestrus* larvae were first observed in the heads of sheep in 1712, by Vallisnieri. This parasite became more generally known through the descriptions of Bracy Clark (1797) and Hertwig (1838). A review of the literature of *Oestrus ovis* shows the widespread interest in this parasite of sheep during the period between 1890 and 1910.

There is no doubt that *Oestrus ovis* is of world-wide distribution. It is the source of more or less constant loss to sheepmen because of its irritation of the nasal passages and sinuses of the head of sheep, and because of the disturbance which results from the deposition of the larvae in the sheep's nostrils. These points are mentioned in practically every discussion of this parasite.

Regardless of the extensive reports on the prevention and control of and treatment for *Oestrus ovis*, it persists in being one of the most common parasites affecting sheep. In the majority of reports treatment is not recommended unless valuable breeding animals are affected, owing to the inaccessibility of the larvae in the sinuses of the head. Butterfield² and Underhill³ state that the only satisfactory treatment consists in trephining the frontal sinuses (usually the seat of most of the trouble), removing the larvae with forceps and washing the sinus out with tepid water.

Many drugs have been advocated for removing the grubs from the nasal passage. Persian insect powder has been introduced into the nares and phenol creosote or turpentine has been introduced into the nasal passage on a feather to dislodge the grubs. A teaspoonful of benzene introduced into each nostril, while the nose is elevated, is recommended by Underhill.³

Several authors refer to fumigation with sulphur and other irritating fumes to produce violent sneezing in the hope of dislodging and eliminating some of the grubs, though these methods are not stated as being effective. The application of repellents,

*Published with the approval of the Director of the Idaho Agricultural Experiment Station as paper number 70. Received for publication, March 27, 1931.

such as tar and fish oils, to the nose of sheep, is highly recommended for the control of *Oestrus ovis* by most authors. Newell⁴ reports that the application of tar to the nose at 14-day intervals over a five-month period has successfully controlled this parasite in Mississippi. *Oestrus ovis* in sheep continues to be extremely prevalent, however, especially in farm flocks, regardless of present preventive measures and treatments advocated.

THE PROBLEM

Discovery of minute, apparently newly deposited larvae in the nasal passages of sheep as early as May 4, and as late as December 13, in the vicinity of Moscow, Idaho, precluded the advisability of attempting to control this parasite here by the use of repellents. It was thought advisable, if possible, to attack this parasite at the most vulnerable stage in its life cycle and where most could be accomplished with the least expenditure of time and labor. Developing larvae as found in the sinuses during the winter season seemed the most logical point of attack, since their destruction would eliminate the presence of flies during the summer months.

The problem, therefore, consisted in finding a suitable drug and a satisfactory method of its introduction into the sinuses of the head. Carbon disulphid, because of its lethal effect on similar larvae, was selected among other drugs as a possible remedy for this use. It was found that the vapor of carbon disulphid which rises from one cc of the drug in a test-tube would kill the larvae of *Oestrus ovis* within one minute. Many of them were killed within fifteen seconds.

In order to determine the best method of introduction of the drug into the sinuses of the head, as well as to learn the effect of the drug on the larvae as they are found in the sinuses, infested sheep heads were obtained from a local packing-plant for study.

INTRODUCTION OF MEDICATION

The middle nasal meatus leads directly to the group of foramina that connect with the sinuses. (See figure 1.) The ventral meatus, when used for the introduction of medication, transmits it to the pharynx at least in part. When the head is placed with the dorsal part down, the medication collects in the dorsal meatus until a considerable amount has been introduced, when it overflows into the middle meatus and passes into the foramina. If, however, the head is laid with the side down and the median septum parallel with the horizontal plane, the introduction of

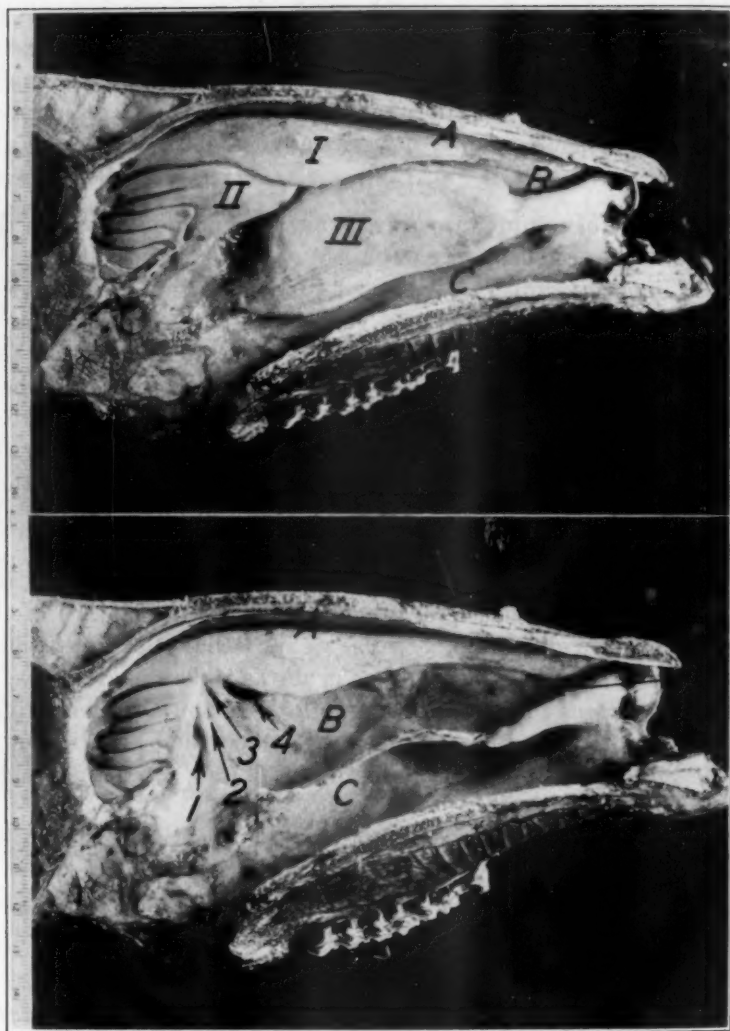


FIG. 1. Two medial views of the nasal passage and associated organs, with the nasal septum removed (mature sheep). The lower view has the ventral turbinate and part of the middle or ethmo turbinate removed. I, dorsal turbinate; II, middle or ethmo turbinate; III, ventral turbinate; A, dorsal meatus; B, middle meatus; C, ventral meatus; 1, foramen to posterior frontal sinus; 2, foramen to anterior frontal sinus; 3, foramen to dorsal turbinate sinus; 4, foramen to maxillary sinus. (Arrow denotes position of syringe for the introduction of medication.)

1 cc of carbon disulphid is sufficient to cause the passage of a large portion of it into the foramina and eventually into the sinuses. Most of it passes into the frontal sinus.

FORAMINA AND SINUSES INVOLVED

The foramen leading to the posterior portion of the frontal sinus is larger than and slightly below that leading to the anterior

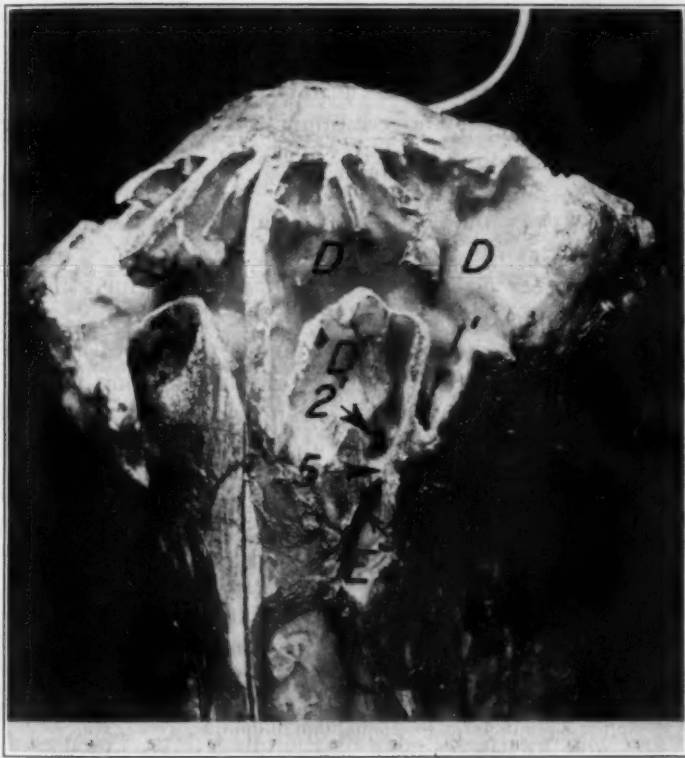


Fig. 2—Dorso-lateral view of normal frontal and dorsal turbinate sinuses of mature sheep head opened. Photograph was taken with the mucous membrane intact. D, posterior frontal sinus; D', anterior frontal sinus; E, dorsal turbinate sinus; 1', 2', 3', foramina to nasal cavity; 5, mucous membrane division of anterior frontal and dorsal turbinate sinuses.

portion. (See figures 1 and 2.) The anterior portion of the frontal sinus is completely separated from the posterior by a bony septum. A foramen leads to the sinus of the dorsal turbinate directly from the middle meatus. A double layer of mucous membrane separates the anterior frontal sinus from the dorsal turbinate sinus. In some young subjects these sinuses are continuous at this point. The maxillary sinus opens into the middle meatus from

the dorsal medial border. Considerable variation is found in different specimens in regard to the size of both the foramen leading to the frontal sinus and the sinus itself.

Drainage from both sections of the frontal sinus is excellent, being downward and forward through the foramina connecting them with the nasal cavity. Drainage from the maxillary sinus and the sinus of the dorsal turbinate is very poor, owing to the location of such foramina.

LETHAL DOSE

In order to determine the lethal dose of carbon disulphid, when introduced in the above manner, three Hampshire yearling ewes were selected and treated. The first ewe received 2 cc of carbon disulphid in each nostril. This ewe had difficulty in breathing and was unable to get on her feet for a moment, but was apparently normal again within five minutes. The second ewe, which received 3 cc in each nostril, stopped breathing entirely. A third ewe, which received 3 cc of a solution composed of equal parts of carbon disulphid and light mineral oil in each nostril, was able to get on her feet, but showed considerable distress and loss of equilibrium for about two minutes, after which she appeared to be normal. Later studies indicate that this latter dose regularly causes such a disturbance but it has not been found to be more than temporary in nature.

Sheep have been slaughtered and the heads examined as early as one hour and as late as nine days following treatment with this latter solution. No evidence of lung disturbances was detected in any of the treated sheep. Considerable inflammation and thickening of the mucous membrane in the sinuses was in evidence two to five days following treatment. This rapidly subsided and was practically gone by the ninth day. The use of this solution (equal parts of carbon disulphid and mineral oil) was found to be practically as satisfactory as pure carbon disulphid for killing the larvae when checked in a test-tube.

DISTRIBUTION OF LARVAE

Minute larvae measuring approximately 2 mm. in length are found abundantly in the nasal passage during fly time. Larger larvae are found most abundantly in the posterior frontal sinuses, with occasional specimens in the maxillary and dorsal turbinate sinuses. Larvae have not been found in other sinuses. The distribution of larvae found in 42 sheep heads was: 77 in the frontal

sinus, 19 in the maxillary sinus, and 14 in the dorsal turbinate sinus. One hundred and eighty-three recently deposited minute larvae were found in the nasal passage.

TREATMENT

In practically all trials conducted up to the present time, one side of the head only has been treated, leaving the other as a check. This can be done where the head is to be examined soon after treatment. Treatment of live sheep has consisted in introducing 3 cc of a solution composed of equal quantities of carbon disulphid and thin mineral oil.

Excellent results were obtained in the treatment of 14 heads after slaughter. Twenty of twenty-three larvae present on the treated side were killed by treatment. Twenty-two live larvae were found on the check side. Less satisfactory results were obtained in treatment of twenty-one living sheep. The heads of these sheep were examined upon slaughter. Six of sixteen larvae on the treated side were dead upon examination. Nine living and one dead larvae were found on the check side. This represents only 36 per cent efficiency in this group.

The success of the treatment depends entirely upon getting some of the medication into the infested sinuses. One factor that reduces this possibility is an excessive purulent discharge from the infested sinuses which plugs the foramina.

The presence of the drug in the nasal passage does not seem to kill minute larvae found there, probably because of the dilution of the carbon disulphid vapors and its elimination during breathing.

Recognition is due the management of the Hagan and Cushing packing-plant and the federal inspectors, Dr. A. S. Martin and Dr. I. L. Barstow, for the many ways in which they assisted in the furtherance of this project.

SUMMARY

1. The frontal sinuses of sheep are most often infested with *Oestrus ovis* larvae.
2. Carbon disulphid is extremely toxic to *Oestrus ovis* larvae.
3. A large portion of one cubic centimeter of carbon disulphid can be introduced into the frontal sinuses of sheep through the middle nasal meatus.
4. The lethal dose of carbon disulphid for sheep, when given in equally divided portions in each nostril, is six cubic centimeters.

5. Three cubic centimeters of a solution composed of equal parts of carbon disulphid and light mineral oil, introduced into each nostril of sheep, is of decided value in killing *Oestrus ovis* larvae in the sinuses.

6. The success of this treatment depends entirely upon getting some of the medication into the infested sinuses.

REFERENCES

- ¹Hutyra, F., and Marek, J.: Pathology and Therapeutics of the Diseases of Domestic Animals (3rd (Eng.) ed.; Alexander Eger, Chicago, 1926).
²Butterfield, I. F.: *Oestrus Ovis*. Jour. Comp. Med. & Vet. Arch., xxi (1900), 1, pp. 23-24.
³Underhill, B. M.: Parasites and Parasitosis of Domestic Animals (MacMillan, New York, 1924).
⁴Newell, Paul F.: Internal parasites of sheep. Miss. A. & M. Coll., Ext. Cir. 52 (1929).

Meat Inspection Ordinance for Saint Louis

The Board of Aldermen of Saint Louis, Missouri, on June 25, 1931, passed an ordinance providing for municipal meat inspection. An appropriation of \$20,000 was made available for carrying on the work.

The ordinance provides for the appointment of a Chief Meat Inspector, at a salary of \$3800 per annum, and a corps of 25 to 30 meat inspectors. The Chief Meat Inspector is required to be a graduate veterinarian with experience in meat inspection in an administrative capacity. Two of the meat inspectors have already been appointed—Dr. Benjamin Ballou (K. C. V. C. '10) and Dr. L. C. Stewart (K. C. V. C. '18). They will receive \$225 per month.

Veterinary Officers to Meet

A meeting of veterinary officers, both active and reserve, will be held at the Hotel Baltimore, Kansas City, Thursday morning, August 27, at 9 o'clock. Veterinary officers from Canada, Cuba and Mexico, as well as other veterinarians interested are invited to attend. Papers or addresses will be presented by the following:

"A Short Review of the Army Veterinary Service Activity During the War," by Gen. Sir John Moore.

"Organizing Veterinary Hospitals Under War Conditions," by Col. Reuben Hilty.

"The Advantages and Opportunities of the Reserve Corps from a Reserve Officer's Standpoint," by Lt. Col. Campbell.

There will also be a paper and discussion by Maj. George H. Koon and Capt. J. A. McCallam, of the Veterinary Corps of the Army. All veterinarians interested in the promotion of the Veterinary Corps are invited to attend.

N. S. M.

ARTIFICIALLY INDUCED HYPOGLYCEMIA AND HYPOCALCEMIA IN THE COW AND THE RELATIONSHIP TO PARTURIENT PARESIS OR MILK FEVER*

By WILLIAM E. PETERSEN, E. A. HEWITT, W. L. BOYD and
W. R. BROWN

*Divisions of Dairy Husbandry, Veterinary Medicine and Bio-
chemistry, University Farm, Saint Paul, Minnesota, and the
Department of Veterinary Physiology, Iowa State
College, Ames, Iowa*

Probably no problem has baffled the investigator more than the etiology of parturient paresis. Considerable interest as to the cause of this condition has been revived during the past decade, which has resulted in the evolution of numerous theories with the stimulation of a vast amount of research. As a result of continued investigations, many of the proposed theories have been discarded and additional support added to others.

It seems an established fact that the prevalence of milk fever is correlated with the improved methods of agriculture and the development of superior milking qualities which have resulted from the employment of scientific methods of breeding and feeding cattle.

Milk fever is a disease almost exclusively confined to cattle although it has been reported as occurring in goats, sheep and swine.

Fish¹ reviewed the history and incorporated an extensive bibliography in an article in which he discussed the sugar theories as explaining the cause of milk fever and concluded that a variation in the sugar content of the blood, either above or below normal, has not been satisfactorily demonstrated as the causative factor, and considers it more likely a secondary factor resulting from an interference with the processes of oxidation in the tissues.

Hayden and Sholl² reported that the normal standard of sugar in the blood is definitely lower in the cow, goat and sheep than in the blood of man or the dog. They found in a herd consisting mostly of milk cows (an average of 75 tests on 44 cows) the blood sugar to be 51.75 mg. per 100 cc of blood.

*Published with the approval of the Director as Paper No. 953, Journal Series, Minnesota Experiment Station. Received for publication, April 15, 1931.

Hayden³ states that his figures from the use of the Benedict method in the determination of sugar in the blood of the milk cow gave a low average of 41.15 mg. per 100 cc of blood.

Schlotthauer⁴ reports that the average blood-sugar content in a group of ten non-lactating cows was 65.45 mg. for each 100 cc of blood, the highest was 70.90 mg. and the lowest 59.85 mg.

In a group of lactating cows, yielding from 8 to 30 pounds of milk daily, the blood sugar averaged 63.59 mg. per 100 cc of blood, with a range from 68.45 mg. to 59.98 mg. In another group of lactating cows, yielding from 45 to 58 pounds of milk daily, the blood sugar averaged 61.19 mg. per 100 cc of blood with a range from 68.72 to 52.9 mg.

Amadon⁵ reports that the normal average sugar content of blood samples secured from thirty-five lactating and non-lactating cows and one bull was 68.5 mg. per 100 cc of blood, with a range of from 40 to 86.9 mg.

Hewitt⁶ found the blood-sugar average of 94 determinations on four heifers, one bull and one steer under two years of age, was 95.9 mg. per 100 cc, and that the blood-sugar average of eight determinations on three non-lactating cows was 89.1 mg. per 100 cc of blood, whereas the blood-sugar average of eight determinations on three lactating cows was 54.1 mg. per 100 cc of blood.

Widmark and Carlens⁷ state that the blood sugar for the dry cow and heifer is around 80 mg. per 100 cc, and for the milking cow as low as 40 mg. per 100 cc, with an average of 60 mg. Auger⁸ confirmed the findings of Widmark and Carlens.

Maguire⁹ states that the sugar content of the blood of the cow normally ranges from 80 to 120 mg. per 100 cc of blood.

From the above investigations it is apparent that the sugar concentration in the blood of cows is subject to quite wide variations but the general conclusion can be drawn that the sugar level is lower in lactating cows than it is in heifers and non-lactating animals.

Widmark and Carlens¹⁰ report the successful treatment of cases of milk fever by the use of glucose injections. They found an increase in the blood sugar after udder inflation of cows suffering from this disease and they conclude that hypoglycemia is an etiological factor in milk fever.

Hayden and Sholl¹¹ report the blood-sugar findings for fourteen cases of milk fever which showed 35.7 mg. to 190.4 mg. per 100 cc, with an average of 99.42 mg. From seven of these a

second sample was taken at intervals sufficient that the animals had shown recovery from the attack. These seven samples showed from 35.2 to 98 mg. per 100 cc, with an average of 64.98 mg. Based on these findings, the authors stated there was a hyperglycemia at the onset of the disease.

Several other investigators, among them Schlotthauer⁴ and Amadon,⁵ report an increase in the total blood sugar in cows suffering from milk fever.

Amadon¹² produced an artificial hypoglycemia in a cow by the injection of iletin (Eli Lilly and Co.), being able to reduce the blood sugar from 55.5 mg. to 41.6 mg. per 100 cc in two hours by the injection of 480 units of this product. A further administration of 800 units of iletin, on the same day, brought the blood sugar down to 23.5 mg. per 100 cc. After the injection of this amount of iletin, the animal became comatose in the recumbent position.

Numerous other theories have been advanced as to the cause of milk fever. Moussu¹³ advanced a theory of a hypocholesteremia as a hypothesis for the cause of milk fever. Hayden³ reports that the cholesterol content of the blood is not increased by udder inflation, and concludes that hypocholesteremia does not contribute to the cause of milk fever.

Dryerre and Greig¹⁴ suggest that certain symptoms observed in milk fever are analogous to those seen in animals deprived of their parathyroids, or those in which a parathyroid deficiency exists, particularly with reference to the guanidine function.

Fish¹⁵ reports the effects of injecting 200 cc of a solution containing 60.75 grams of guanidine carbonate into a heifer weighing 980 pounds, which resulted in increasing the sugar in the blood 18.7 per cent. The urea in the blood was increased 9.7 per cent and the non-protein nitrogen was increased 17.2 per cent.

Hayden³ reports that the guanidine average is higher after udder inflation than before. A guanidine toxemia due to parathyroid deficiency or other causes should show a greater guanidine content in the samples before inflation. He concludes that the evidence is against the contribution of guanidine to the cause of milk fever.

The work of Little and Wright,¹⁶ of Dryerre and Greig¹⁷ and of Fish¹⁵ has shown that there is a marked diminution in the amount of blood calcium in cows down with milk fever.

Fish¹⁸ found in 18 cases of milk fever the blood phosphates were uniformly and consistently lower than normal. The calcium

was likewise found to be subnormal, confirming the earlier work of Little and Wright and agreeing with the observations of Dryerre and Greig.

Fish¹⁹ reports that the examination of 27 cases of milk fever gave a range from 1.75 to 6 mg. of calcium per 100 cc, with an average of 3.31 mg. Little and Wright¹⁶ found a range of 3.35 mg. of calcium per 100 cc to 7.16 mg. with an average of 5.18 mg. per 100 cc.

Meigs *et al*²⁰ found the plasma calcium content in cows to be between 8.6 and 11.4 mg. per 100 cc of blood, practically unaffected by pregnancy, lactation, or considerable changes of diet. In calves, however, it is higher, up to 111 mg. per 100 cc of blood.

Sjollema²¹ reports upon studies of the blood which have shown that a mineral metabolism is disturbed in milk fever. He maintains that the disease is a disturbance of the vegetative nervous system and a "labile" condition of the parathyroids, in which they are unable to respond to increased demands put upon them. The calcium of the blood serum in most cases is about 5 mg. per 100 cc. That calcium deficiency plays an important role in the onset of milk fever may be concluded from the rapid recovery of more than 20 cows by the intravenous injection of 300 to 400 cc of a 10 per cent solution of crystallized calcium chlorid. In a few other cases there was a transient recovery, a relapse occurring in 24 hours or later. After mammary inflation there was an increase in the percentage of calcium, which also points to the significance of the calcium deficiency.

EXPERIMENTAL PROCEDURE

THE EFFECT OF HYPOGLYCEMIA IN THE COW

To produce hypoglycemia, insulin was injected intravenously into two cows in three experiments. The cows used (141 and 143) were pure-bred Jerseys. Cow 143 was lactating, while cow 141 was dry.

In all cases blood samples for sugar determination were taken from the jugular vein before the injection of insulin and then at intervals thereafter. The blood sugar was determined by the Folin-Wu method. Temperatures of the animals were taken before and at intervals following the administration of insulin. The animals were constantly watched for any abnormal symptoms that might appear.

In trial I (cow 143) 800 units of insulin were injected in four equal portions at 8:40 a. m., 11:10 a. m., 11:50 a. m. and 1:55 p. m.

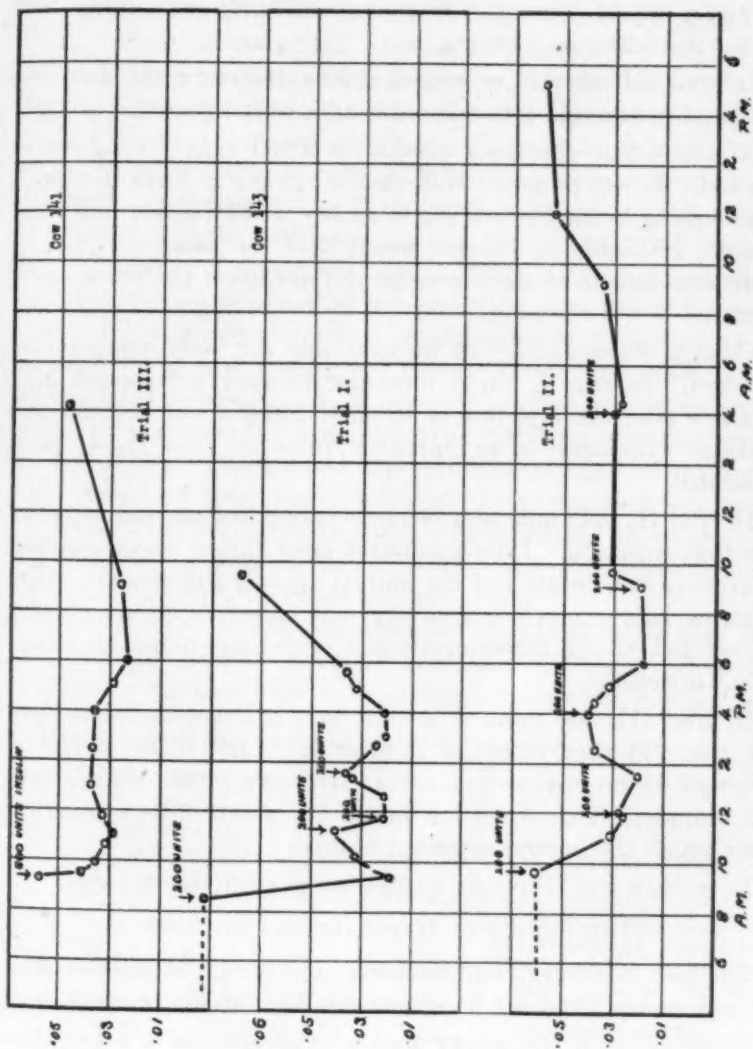


CHART 1. The effect of insulin on the blood sugar of cows (expressed in per cent).

In trial II cow 143 was used again but was not given any feed for 48 hours before the experiment and while on trial 1000 units of insulin were administered in five portions of 200 units each, at 9:45 a. m., 11:50 a. m., 4:00 p. m., and 9:00 p. m., and at 4:00 a. m., the following morning.

In trial III cow 141 was used after a 48-hour fast. Between 9:15 and 9:40 a. m., 800 units of insulin were injected.

Results: The effects of insulin on blood sugar are given in chart 1. It will be noted that insulin rapidly reduces the blood sugar, going down, in trial II, to as low as 17 mg. per 100 cc of blood. It should be further noted that the administration of additional insulin at the low point did not lower the blood sugar further.

Clinical observations: In no case was the body temperature affected. In trial I, slight muscular tremors were noted fifty minutes after the injection of the first 200 units of insulin. No unusual symptoms were apparent following the three other injections.

In trial II, mild muscular tremors were noted one minute after the first injection. Fifteen minutes later there was a marked dilation of the pupils and the animal appeared depressed. Five minutes later, complete recovery was noted, with no further appearance of the above-mentioned symptoms following subsequent injections.

In trial III, 800 units of insulin were injected in twenty-five minutes. Marked muscular tremors developed in five minutes, followed by profuse watery nasal excretions which dripped into the manger. This condition lasted for about fifteen minutes, after which the animal appeared normal.

In no case was there any suggestion of paralysis or coma.

THE EFFECT OF HYPOCALCEMIA IN COWS

The previous experiment demonstrated to our satisfaction that hypoglycemia could not be responsible for milk-fever symptoms.

Speculating on the theory that a hypocalcemia is a factor in the cause of milk fever, it was thought that it should be possible to produce artificial conditions simulating milk fever by displacing the calcium. It was therefore decided to produce hypocalcemia to determine definitely whether or not this condition alone would produce symptoms analogous to milk fever. It is well known that sodium citrate reacts with ionized calcium in the blood to form

unionizable calcium citrate, and thus displaces the ionized calcium in the blood.

Intravenous injection of sufficient sodium citrate should lower the ionized calcium of the blood and produce hypocalcemia, which should demonstrate whether or not a low blood-calcium alone can produce symptoms analogous to milk fever.

The first part of this work was to try the effect of sodium citrate injected intravenously into rabbits. The injection of 4.5 cc of a 1 per cent solution of sodium citrate produced no noticeable effect in a rabbit weighing 1810 grams. Two cc of an 8 per cent solution of sodium citrate injected slowly into the posterior auricular vein of a rabbit weighing 1500 grams produced tetany and prostration in about 30 seconds. The injection of 2 cc of an 8 per cent solution of calcium chlorid restored the animal in one minute. The experiment was repeated with two other rabbits with the same results. A 20 per cent solution of sodium citrate was slowly injected into the posterior auricular vein of a rabbit. As the injection progressed, the rabbit went into violent tetany and then into complete anesthesia. A 20 per cent solution of calcium chlorid was then injected, which brought about complete recovery in less than one minute. This experiment was repeated several times with the same results.

After the preliminary experiments on rabbits, cows were used for the experiments. A 20 per cent sodium citrate was used in all cases. In each case it was injected into the jugular vein.

TABLE I—*Typical observations of hypocalcemia produced by intravenous injection of sodium citrate*

TIME	INJECTED SODIUM CITRATE (20% SOLUTION) (cc)	INJECTED CALCIUM CHLORID (20% SOLUTION) (cc)	OBSERVATION
1:43 p.m.	30		No clinical symptoms
1:48 p.m.	30		Slightly dull eye; lost alertness
1:59 p.m.	30		Ears drooped; shook head; slight paralysis over loin
2:08 p.m.	60		Anesthesia of skin over the loin; barely able to walk
2:17 p.m.	30		Paralysis extending forward; dyspnea
2:22 p.m.	60		At 2:24 went down; completely paralyzed; marked dyspnea; animal considered in extremis
2:25 p.m.		60	
2:28 p.m.	0	0	Back on her feet; apparently normal in all respects

Seven experiments on five cows were conducted at the University Farm, Saint Paul: two experiments on one high-grade Holstein cow, four experiments on three pure-bred Jersey cows, and one experiment on a pure-bred Guernsey cow. Table I gives the details for one experiment on a grade Holstein cow, which is typical of dairy cows.

The injection of 30 cc of a 20 per cent sodium citrate solution had no visible effect. Subsequent injections caused a drooping of the ears followed by a staggering gait as a result of incoördination of the hind legs. Further injections caused complete paralysis from the lumbar region posteriorly, while the animal still retained more or less control of the head and fore legs. The eyes, however, became glassy and starey. Further injections caused the animal to develop complete paralysis with marked dyspnea. An intravenous injection of a 20 per cent solution of calcium chlorid effected a rapid and complete recovery.

Table II gives a summary of the experiments, performed at University Farm, with injection of sodium citrate, giving the amounts injected and the time over which the injections took place, together with the amounts of calcium chlorid solution injected and the time for recovery. Similar experiments were conducted by one of us (E. A. H.) at Iowa State College.

The first animal used in this series of experiments was a grade Holstein cow. This animal withstood the intravenous injection of 400 cc of 20 per cent sodium citrate solution. Although this did produce decided muscular tremors, the animal remained on its feet. The sodium citrate solution was injected by means of a 40-cc syringe over a period of twenty minutes. No calcium chlorid was administered to this animal.

TABLE II—Summary of experiments with intravenous injection of sodium citrate into cows of dairy type

Cow	AMOUNT OF SODIUM CITRATE TO PRODUCE PARALYSIS (cc)	TIME FROM 1ST INJECTION TO LAST (MINUTES)	AMOUNT OF CALCIUM CHLORID INJECTED (cc)	TIME FOR RECOVERY (MINUTES)
ES1	240	39	60	3
ES1	240	34	None	Slow spontan- eous recovery
141	250	17	60	2½
143	210	9	60	1½
143	270	14	60	1½
547	210	9	60	1½
171	110	—	90	1¼

Two grade Shorthorn cows were subsequently killed by the rapid injection, under pressure, of 800 and 600 cc respectively, of sodium citrate solution. Both animals failed to respond to the injection of 800 cc of a 20 per cent solution of calcium chlorid.

Another grade Shorthorn cow which was to be used for anatomy dissection was given 640 cc of the sodium citrate solution into the jugular vein by means of a 40-cc syringe over a period of 32 minutes at which time the animal went down. This was preceded by a period of excitement, muscular tremors and incoördination. There was also a marked expiratory dyspnea present. This animal was allowed to remain in the recumbent position without being given the calcium chlorid treatment. Forty-five minutes later, the animal was urged to get up but walked with a decidedly stilted gait and showed signs of tetany and incoördination. The animal was again put down by the intravenous injection of 160 cc of the sodium citrate solution. The animal was then bled out, preparatory to embalming. A sample of blood was collected from this animal which was only partially coagulated in 40 minutes. Smears of this blood showed crenated red blood cells and anisocytosis.

Another cow, a grade Shorthorn was given 500 cc of sodium citrate solution over a period of 20 minutes, at which time the animal went down. She showed muscular tremors, although the expiratory dyspnea was absent. In one and one-half minutes after the animal went down, 120 cc of a 20 per cent solution of calcium chlorid was injected intravenously and in three minutes the symptoms produced by the sodium citrate had entirely disappeared.

The next animal, a grade Shorthorn cow, was injected with 360 cc of the sodium citrate solution intravenously and in three and one-half minutes the animal was down. She made attempts to rise but there was a lack of coördination. The pupils were greatly dilated, there was a marked expiratory dyspnea and the act of breathing was accomplished with considerable noise. Nine minutes after the animal went down, 60 cc of calcium chlorid solution was administered intravenously. The pupils immediately constricted down to normal, the dyspnea and noise of breathing ceased and all the symptoms produced by the injection of the sodium citrate disappeared at once.

The next subject was considerably more of a dairy type than were the preceding animals. This cow received 420 cc of sodium citrate solution intravenously over a period of seven minutes, which

caused the animal to go down. This cow did not show the muscular tremors of the previous cases, although a marked expiratory dyspnea was present. The condition in this case more closely simulated that found in milk-fever cases. There was present the comatose condition so characteristic of milk fever. After the animal had been in this condition for twenty minutes, 100 cc of calcium chlorid solution was administered by intravenous injection. The respiratory symptoms disappeared at once, although the coma persisted. Sixty cc more of the calcium chlorid solution was given and in five minutes the animal got up on its feet, and at first was unsteady but, after taking a few steps, appeared apparently normal.

DISCUSSION AND CONCLUSIONS

Hypoglycemia: The data presented bring out two important considerations:

1. Hypoglycemia is not analogous to milk-fever symptoms.
2. The bovine tolerates a much lower blood-sugar level than is reported for other species.

The rather prolonged cases of hypoglycemia, going as low as 17 mg. per 100 cc in trial II, should dispel any question as to low blood sugar being a cause of parturient paresis.

Hypocalcemia: From these experiments it is noted that beef types apparently react somewhat differently than dairy types. The beef animals gave some evidence of tetany, while only one of the dairy animals showed any symptoms that could be likened to tetany. This was with a pure-bred Guernsey in a strange environment when a demonstration was given before a large group. With beef types, apparently, hypocalcemia may produce symptoms more analogous to tetany.

Before the symptoms of hypocalcemia become too pronounced, the animal may effect a rather rapid spontaneous recovery. If only sufficient sodium citrate is injected to cause a marked staggering gait, spontaneous recovery is effected in a short time. Whether this is effected through an oxidation of the citrate radical of the calcium citrate and thus freeing the calcium ion, or whether it is due to the release of calcium ions from the body stores, is not known.

The administration of calcium chlorid requires care and skill. Calcium chlorid in 20 per cent solution must be given intravenously. If not carefully administered, varying amounts of the

solution will be deposited in the tissues, which may result in edema, abscessation, necrosis and phlebitis.

REFERENCES

- ¹Fish, P. A.: The physiology of milk fever. I. *Corn. Vet.*, xvii (1927), 2, pp. 99-120.
- ²Hayden, C. E., and Sholl, L. B.: A study of the extractives of the blood of the cow. *Rpt. N. Y. State Vet. Coll.*, 1923-1924, p. 102.
- ³Hayden, C. E.: Sugar, guanidine and cholesterol in the blood of the cow in milk fever. *Corn. Vet.*, xix (1929), 3 pp., 285-295.
- ⁴Schlotthauer, C. F.: Theories on the etiology of milk fever: Experimental investigations. *Corn. Vet.*, xviii (1928), 3, pp. 217-224.
- ⁵Amadon, R. S.: Experimental study of milk fever. *Univ. Pa. Vet. Ext. Quar. Bul.*, xxviii (1928), 16.
- ⁶Hewitt, E. A.: The blood-sugar level of the bovine. *Jour. A. V. M. A.*, lxxvii (1930), n. s. 30 (3), pp. 362-367.
- ⁷Widmark, E., and Carlens, O.: Ueber die Blutzucker Konzentration bei Kuhen und die einfluss der Laetationsintensitat auf dieselbe. *Biochem. Ztschr.*, clvi (1925), p. 454.
- ⁸Auger, L.: Recherches sur la pathogenie de la fièvre vitulaire. *Rev. Gen. de Med. Vet.*, xxxv (1926), p. 353; *Abst. P. A. Fish, Corn. Vet.*, xvii (1927), 2, pp. 64-73.
- ⁹Maguire, L. G.: Etiology of milk fever. *Vet. Rec.*, vi (1926), p. 52.
- ¹⁰Widmark, E., and Carlens, O.: Parturient paresis: A hypoglycemic coma. *No. Amer. Vet.*, vi (1925), p. 28. (Translated by C. A. Nelson. Original article in *Svensk Veterinartidskrift*, xxx (1925), 1.)
- ¹¹Hayden, C. E., and Sholl, L. B.: Blood and urine of the cow in milk fever. *Rpt. N. Y. State Vet. Coll.*, 1923-1924, pp. 91-101.
- ¹²Amadon, R. S.: Personal communication.
- ¹³Moussu, R.: Recherches sur la pathogenie de la fièvre vitulaire. *Recueil de Med. Vet.*, civ (1928), p. 65.
- ¹⁴Dryerre, H., and Greig, J. R.: Milk fever: Its possible association with derangements in the internal secretions. *Vet. Rec.*, v (1925), pp. 225-231.
- ¹⁵Fish, P. A.: The physiology of milk fever. II. *Jour. A. V. M. A.*, lxxiii (1928), n. s. 26 (1), pp. 10-38.
- ¹⁶Little, W. L., and Wright, N. C.: The aetiology of milk fever in cattle. *Brit. Jour. Exp. Path.*, vi (1925), pp. 129-134.
- ¹⁷Dryerre, H., and Greig, J. R.: Further studies in the etiology of milk fever. *Dumfries and Galloway Vet. Med. Asso.*, July 7, 1928. Oliver and Boyd, Tweeddale Court, Edinburgh.
- ¹⁸Fish, P. A.: The physiology of milk fever. III. The blood phosphates and calcium. *Corn. Vet.*, xix (1929), 2, pp. 147-160.
- ¹⁹Fish, P. A.: Recent progress in our knowledge of milk fever. *Jour. A. V. M. A.*, lxxv (1929), n. s. 28 (6), pp. 695-701.
- ²⁰Meigs, E. B., Blatherwick, N. R., and Cary, C. A.: Phosphorus and calcium. *Jour. Biol. Chem.*, xxxvii (1919), 1, p. 75.
- ²¹Sjollema, B.: Wesen und therapie der paresis puerperalis und der symptomten gruppen, die damit verwandt sind. *Deut. Tierarz. Wchnschr.*, xxxvii (1929), pp. 17-24.

BUREAU TRANSFERS

Dr. Arthur Spitz (U. P. '07) from Philadelphia, Pa., to Dobbs Ferry, N. Y., on meat inspection.

Dr. R. H. Pease (Colo. '27) from Los Banos, Calif., to Sioux City, Iowa, on meat inspection.

Dr. Clarke Hedley (Cin. '07) from Springfield, Mass., to Newark, N. J., on meat inspection.

Dr. P. J. Cass (McK. '08) from Milwaukee, Wis., to South San Francisco, Calif., on meat inspection.

Dr. M. S. Shahan (Colo. '24) from Sacramento, Calif., to Denver, Colo., at the Pathology Laboratory.

Dr. E. A. Williams (St. Jos. '19) from Madison, Nebr., to Watertown, S. D., on meat inspection.

Dr. J. H. Lowe (Iowa '00) from Hoboken, N. J., to Allentown, Pa., on meat inspection.

Dr. R. J. W. Briggs (Chi. '02) from Norfolk, Nebr., to Des Moines, Iowa, on tuberculosis eradication.

Dr. J. R. Houchins (U. S. C. V. S. '17) from New York, N. Y., to Harlan, Ky., on tuberculosis eradication.

Dr. P. A. Franzmann (Cin. '09) from Miles City, Mont., to Mitchell, S. Dak., in charge of meat inspection.

THE SUSCEPTIBILITY OF THE GUINEA FOWL TO BRUCELLA DISEASE*

By M. W. EMMEL, Auburn, Ala.,

*Department of Animal Pathology, Alabama Polytechnic Institute,
and I. FOREST HUDDLESON, East Lansing, Mich.,
Department of Bacteriology, Michigan State College*

The authors^{1,2} have previously reported on the pathogenicity of the species of the genus *Brucella* for the fowl and have described cases of natural *Brucella* infection in this species.^{2,3} Gilman and Brunett⁴ also have observed cases of natural *Brucella* infection in the fowl. Emmel⁵ has reported on the susceptibility of the turkey, pigeon, pheasant, duck, and goose to organisms of the *Brucella* group.

Since the conclusion of these studies, we have observed what appeared to be a case of natural *Brucella* infection in two guinea fowls. Consequently it was decided to determine experimentally the susceptibility of this species to organisms of the *Brucella* group.

EXPERIMENTAL

Procedure: The histories of the strains of *Brucella* used in this experiment are as follows: Strain 25 was isolated by Dr. A. V. Hardy, Iowa State Board of Health, with no record as to the date of isolation. Strain 30 was isolated by Huddleson, in February, 1920, from the udder of a cow. Strain 44 was received from Dr. K. F. Meyer, Hooper Foundation for Medical Research, University of California, and was his original strain 11. Strain 27 was isolated by Dr. Chas. M. Carpenter, New York, in 1925. Strain 31 was isolated by Huddleson, in 1927. Strain 37 was isolated by Dr. Burnet, Tunis, in 1921. The first three strains had been used in previous experiments to determine the susceptibility of the turkey, pigeon, pheasant, duck and goose to *Brucella* organisms. The last three strains were of human origin.

Fourteen mature guinea hens were divided into seven groups of two birds each. Each group of birds exposed to a given strain of the organism was caged separately. The strains used as an infective agent were grown on liver-infusion agar slants for 72 hours at 37° C. They were then suspended in physiological

*Published with the permission of the Director of the Alabama Agricultural Experiment Station. Received for publication, May 25, 1931.

TABLE I—Agglutination titres and isolation of organisms from guinea fowls experimentally exposed to species of the genus *Brucella*

BIRD	METHOD OF INFECTION	SPECIES OF BRUCELLA	AGGLUTINATION TITRE			OUTCOME OF EXPOSURE		ORGANISM ISOLATED FROM
			APPEARANCE (IN DAYS)	PEAK OF TITRE	DISAPPEARANCE (IN DAYS)	DIED OR KILLED	DAYS	
64 66	Oral (in water)	<i>Br. suis</i> 25	14 10	1:200 1:400	42	K K	30 120	Spleen and kidney Negative
74 75		<i>Br. suis</i> 27	14 14	1:200 1:200	35 42	K K	120 90	Negative Negative
76 78		<i>Br. abortus</i> 30	21 21	1:400 1:100	49	K K	120 30	Negative Lungs
69 85		<i>Br. abortus</i> 31	14 21	1:200 1:100	35 56	K K	120 60	Negative Negative
87 94		<i>Br. melitensis</i> 44	7 14	1:200 1:200	35 42	K K	120 90	Negative Liver
92 83		<i>Br. melitensis</i> 47	7 7	1:400 1:100	35	K K	120 30	Negative Lungs, liver, spleen, kidney
67 68	Controls	None		Negative Negative		K K	120 120	Negative Negative

salt solution and fed to the birds by placing the suspension in their drinking water.

The agglutination titres of the birds' blood sera were determined twice a week for two weeks after which they were determined but once a week. The standard tube test was used in all cases. A few of the birds were killed at various intervals in order to study the progress of the infection. The birds remaining at the end of 120 days were killed for further study. At autopsy gentian-violet-liver-infusion agar plates were smeared and incubated aerobically at 37° C. for three days, after which the plates were placed in jars containing 10 per cent carbon dioxid and incubated for five days. In all cases in which the causal organism was isolated it was properly identified, typed, and found to belong to the original species which was fed that particular bird. A histopathological study was made of all the birds.

Results: According to the data secured in these experiments, *Brucella* infection produced a series of agglutination titres characteristic of those previously reported² in the fowl. The titres gradually rose over a rather variable period of one to three weeks to a peak, after which they gradually decreased until they became negative. The birds exposed to *Br. abortus* were slower to develop specific agglutinins than birds exposed similarly to other species of the genus. The two control birds remained negative.

The symptoms produced in the guinea fowl were similar to, although not so extensive as, those produced in the fowl. The birds killed at 90 and 120 days were considerably emaciated. Some paleness about the head, comb and wattles was noted between the 60th and 90th days. Diarrhea was observed in only a few birds during the first week after exposure. The experiment was terminated on the 120th day, as it appeared at this time that the remaining birds would recover from the infection.

Very few macroscopic lesions were produced. In the early stages of the infection the spleen was enlarged, often twice its normal size, while later this organ atrophied to about one third of its normal size. The liver was found to be friable, often congested and, at times, slightly undersized. The kidneys appeared congested. Hemorrhagic and necrotic enteritis was observed in birds killed up to 90 days, but after this time these lesions tended to disappear.

The microscopic lesions studied in these birds were very similar to those found in other species of birds. Perivascular foci of hyperplasia, small but numerous, were found in the spleen. This organ was usually considerably congested. In the liver, cloudy swelling appeared early, to be followed by general hydropic degeneration. This form of degeneration had progressed to such an extent in some of the birds killed on the 120th day that it seems difficult to understand how the organ could retain any of its functional activity. Quite a few perivascular foci, both intralobular and interlobular, appeared early and tended to disappear as the infection progressed. Areas of congestion were common. Focal necrosis appeared in the livers of many of the birds killed on the 90th and 120th days. The tubular epithelium of the kidneys presented a picture of cloudy swelling intermingled with necrosis, the latter usually predominating. The glomeruli were often hyperplastic and two to four times their normal size. Occasionally this hyperplasia tended to extend into adjacent tissue. Areas of congestion were not infrequent. The lungs contained peribronchovascular foci of hyperplasia of histiocytes. Such foci often occurred in the submucosa of the bronchi. Areas of congestion, while not extensive, were rather frequent.

NATURAL INFECTION

The presence of *Brucella* infection in a herd of hogs came to the attention of the junior author in February, 1930. This herd consisted of 125 head of brood sows, gilts and barrows. Agglutination tests on each animal in the entire herd revealed 55 per cent reacting in dilutions above 1:25. The presence of *Brucella* infection was confirmed by slaughter of several of the reactors and the isolation of *Br. suis* from their tissues on culture. Two attendants associated with this herd also developed *Brucella* infection. The two guinea fowls to which previous reference has been made were associated with this herd, eating in the pens with the hogs, roosting in the houses, and in constant contact with the hogs. Agglutination tests showed these birds to react in a dilution of 1:25. Cultures from their organs failed to show growth of *Brucella* organisms.

A histopathological study of the tissues of these birds showed extensive lesions. The intestines, especially the duodenum, showed extensive hemorrhagic and necrotic enteritis. The livers showed general hydropic degeneration, with a few foci

of cloudy swelling still persisting. There were many foci of hyperemia, small and scattered foci of necrosis, and a few small petechiae. The kidneys presented a picture of intermingled necrosis and cloudy swelling of the tubular epithelium, with many hyperplastic glomeruli and areas of congestion. The lungs were quite hyperemic and showed perivascular and periatrinal foci of hyperplasia of histiocytes. Deposits of blood pigment in these foci were not infrequent. Occasionally such foci tended to extend into adjacent tissue.

These microscopic lesions were so similar to those studied in experimentally infected guinea fowls and to those studied in other species of birds in connection with experimental *Brucella* infection, that, when taken with the history of the two guinea fowls in question they would strongly lead one to believe that natural *Brucella* infection existed in these two birds.

SUMMARY

According to experimental data the feeding of massive doses of two strains of each of the species of the genus *Brucella* produced an infection in the guinea fowl which was not fatal within 120 days.

The lesions were similar to those produced in other species of birds by the same infection.

What appears to be a case of natural *Brucella* infection in two guinea fowls has been described.

REFERENCES

- ¹Emmel, M. W., and Huddleson, I. F.: Abortion disease in the fowl. Jour. A. V. M. A., lxxv (1929), n. s. 28 (5), pp. 578-580.
- ²Huddleson, I. F., and Emmel, M. W.: The pathogenicity of the species of the genus *Brucella* for the fowl. Mich. Agr. Exp. Sta. Tech. Bul. 103 (1929).
- ³Emmel, M. W.: An outbreak of *Brucella* disease in the fowl. Jour. A. V. M. A., lxxvi (1930), n. s. 29 (4), pp. 564-565.
- ⁴Gilman, H. L., and Brunett, E. L.: *Bact. abortus* infection in the fowl. Corn. Vet., xx (1920), 4, p. 371.
- ⁵Emmel, M. W.: The susceptibility of the turkey, pigeon, pheasant, duck and goose to *Brucella* disease. Jour. A. V. M. A., lxxvii (1930), n. s. 30 (2), pp. 185-197.

Meeting of Missouri Veterinarians

The regular annual meeting of the Missouri Veterinary Medical Association will be held during the week of the Kansas City convention of the A. V. M. A. There will be no literary program. Officers for the ensuing year will be elected and other routine business will be transacted. It is planned to hold the meeting at the Hotel Baltimore, Thursday afternoon, August 27, following the adjournment of the general business session of the A. V. M. A. convention.

FOUR OUTBREAKS OF FOOT-AND-MOUTH DISEASE (AFTOSA) IN PERU

By J. F. MITCHELL, Oroya, Peru

I wish to report the method and the results of handling four outbreaks of foot-and-mouth disease in Peru.

The Sociedad Ganadera de Junin owns about 800,000 acres of land which straddles the Andes Mountains in central Peru at an elevation of 11,000 to 19,500 feet. In 1929, the Cerro de Pasco Copper Corporation started construction of a power project on the Mantaro River, at Malpaso, on one of the Sociedad's haciendas called Atoesaico. This project gave a market for produce, among which meat figures prominently. The meat inspection laws of Peru are modern, but because Malpaso is new and small, it was impossible to enforce thorough inspection. Some cattle with foot-and-mouth disease (aftosa) got by and in driving them over the Sociedad's land, they infected the road. The disease broke out in five herds (about 600 head) of Sociedad cattle a few days after infected cattle were driven through. Foot-and-mouth disease was reported to the central office in August, 1930. At that time there were fifteen pronounced cases.

All cattle were driven back off the road into the hills and treatment started. The treatment consisted of swabbing the ulcers in the mouth with a 50 per cent solution of tincture of iodine, containing 15 per cent glycerin; while for the ulcers on the feet a mixture of vaseline and iodine was used. The calves were turned with the cows. These herds were about five miles from the hacienda buildings, where were quartered 125 pure-bred Brown Swiss cattle. Special attendants were allotted, who stayed on the job night and day. I do not believe these herds infected more cattle.

Things went along fairly well for a month, when a new outbreak occurred about eight miles above the hacienda on the main road, this time in three pure-bred bulls. The mayordomo, not waiting to report the nature of disease in the bulls, drove one of them down to the hacienda proper and quartered him in the stables there. Of course we tried to isolate the case at the hacienda but in about ten days the main herd had it. At the same time the disease started up in the Tingo quebrada, a long narrow mountain valley leading off the main road. According to Peruvian custom, the herds here are divided into lots of cows, usually 50 head.

*Received for publication, June 1, 1931.

These are run along with their calves and six bulls, entirely separate from other herds. The cows are milked once a day, the calves getting what is left. The herds in the Tingo Valley, as they took the disease, were driven back off the trail and treated. There are fourteen herds in the Tingo Valley. The last of them was reported infected in the middle of December. Since January 15, 1931, no new cases have been reported and we hope the disease has been exterminated. In other words, it took four months for the disease to spread up a mountain valley a distance of eight miles.

Foot-and-mouth disease broke out on the hacienda Paria in September, 1930, in three herds widely separated. The disease on this hacienda spread more rapidly than on Casaracra, because it is very badly cut up with roads. It ran its course by the first of December, 1930.

There are a good many thousand sheep and many pigs and goats on this hacienda; among them only two cases of foot-and-mouth disease were reported and these were doubtful. No pigs or goats were known to have been attacked nor were there any cases in people. A herd of 65 pure-bred Angora goats was quartered in the same corral and ate the left-over grain from two bulls that had foot-and-mouth disease, without developing evident cases. Llamas, alpacas and vicuñas are said to be susceptible to foot-and-mouth disease; however, I have never seen a case among them.

Cattle that were in good shape, fairly fat and strong, did not die. We lost none of the pure-breds, but we did have four abortions among them. The hospital herds lost heavily because the cattle in them were thin and could not stand a week's starvation. In the regular milking herds the loss was small. Some driveling of saliva was present in all the cases; very pronounced slobbering, with foam and saliva running in quantities from the mouth, was rare. I personally saw only two such cases; both were in big Brown Swiss bulls. They got well. Very severe lameness, making it impossible for the animals to stand or move, was rare. I saw three such cases; they all died. Fifty per cent of the animals showed some lameness during the course of the disease, usually in one foot, although sometimes in two, and one case in all four feet. These cattle are range-bred and fed; they will not eat hay or grain. Usually two swabbings of the ulcers cleared things up so that the animal could eat.

In a herd of about 100; about 10 per cent of the animals would be attacked at a time, so that to go through a herd from start to

finish took from four to six weeks. In each of the first herds attacked, we put several susceptible animals, four months after the outbreak. All have remained healthy.

Tables I and II show that number of animals on these haciendas and the number of deaths due to foot-and-mouth disease.

A man drove a herd of hogs that were infected with foot-and-mouth disease on to Cochabamba (one of the Sociedad's haciendas). They slept in a corral near the hacienda and through the negligence of our administrator and mayordomo they were allowed to continue cross-country to Jauja, a town about eighty miles away. Twelve days following this, nine cases developed, and the central office was notified. We killed 29 head of cattle, sick, exposed, and probably exposed, and put a strict quarantine on the hacienda. Later two cows strayed on to infected ground and were killed. That was two months ago and since then nothing new has developed.

On Pachacayo, foot-and-mouth disease broke out in one herd of 28 animals, about $1\frac{1}{2}$ miles from the hacienda buildings. This was reported 21 days after the first case, during which time the cows had been milked daily and the milk taken to the main hacienda. When the herd was seen by me there were two cases present. These were shot and quarantine imposed. Four days later the herd was moved to infected territory, four animals being killed at the second visit. Nothing new has developed although I rather expect more trouble.

TABLE I—*Animals exposed to foot-and-mouth disease*

HACIENDA	CATTLE	SHEEP	LLAMAS	GOATS	HOGS
Casaracra	1948	11,539	390		
Paria	2134	10,154		560	82

TABLE II—*Deaths from foot-and-mouth disease*

MONTH	CASARACRA			PARIA		
	COWS	STEERS	CALVES	COWS	STEERS	CALVES
August.....	6	—	1	—	—	—
September.....	42	—	10	23	15	9
October.....	32	2	5	23	14	5
November.....	72	6	4	5	8	3
December.....	10	1	—	—	—	—
January.....	8	—	—	—	—	—
Totals.....	170	9	20	51	37	17
Grand Totals.....	199			105		
Percentage.....	10.2			4.9		

A STAINED ANTIGEN FOR THE RAPID WHOLE BLOOD TEST FOR PULLORUM DISEASE*

By JACOB M. SCHAFER and ANGUS D. MACDONALD,
Biochemic Division, and

WALTER J. HALL and HUBERT BUNYEA, *Pathological Division,
Bureau of Animal Industry, U. S. Department of Agriculture,
Washington, D. C.*

In 1929, Bunyea, Hall and Dorset¹ reported a simplified method for the detection of pullorum disease by a rapid agglutination test, using whole blood. This method has since been tried by a number of workers in this country and abroad and found to possess value as a diagnostic agent. Since the publication of the report of Bunyea, Hall and Dorset, it has been recognized that the antigen employed had certain weaknesses. It was not adequately preserved and therefore subject to contamination. Furthermore, it contained live pullorum organisms, a distinct disadvantage when a test was to be made on a farm. As a result of an appreciation of these deficiencies, the question of a better antigen was made the subject of further study. This has led to the development of a new antigen which is adequately preserved, in which the pullorum organisms are killed, and in which the bacteria are deeply stained by means of crystal violet.

PREPARATION OF ANTIGEN

This stained antigen is prepared as follows:

Pullorum strains: Three strains of *Salmonella pullorum*, selected in 1928 by the Eastern States Laboratory Workers' Conference, as suitable for the tube agglutination test.

Culture medium: Beef infusion agar, containing 2 per cent peptone, 0.5 per cent sodium chlorid, 3 per cent agar and adjusted to a pH of 7.2, is distributed in 300-cc Erlenmeyer flasks, 100 cc to each flask. This medium is autoclaved 20 minutes at 15 pounds pressure. After the agar has cooled and become quite firm, each flask is seeded by flowing 1 cc of a 24-hour beef-infusion culture of *S. pullorum* over the surface. An equal number of flasks are seeded with each strain. The flasks are capped with tinfoil and incubated at 37.5° C. for six days.

*Received for publication, June 11, 1931.

Preparation of suspension: The bacteria are washed from the agar surface of a single flask with 10 cc of a solution containing 1 per cent liquor formaldehydi, U. S. P. (0.4 per cent actual formaldehyde) and 0.85 per cent sodium chlorid. The solution is allowed to stand on the culture until the growth can be detached from the agar surface by gentle agitation. This usually requires about 10 minutes. The suspension thus obtained from the first flask is poured into a second and then into a third flask, the procedure for each being the same as with the first flask. The washings from the third flask are placed in a receiver. The three flasks are now rinsed in rotation with an additional 10 cc of the formaldehyde-salt solution. This system is followed with the remaining flasks, all of the washings and rinsings being united in a single receiver. The bacterial suspension is now passed through a thin layer of absorbent cotton in a Buchner filter with the aid of suction. The density of the perfectly uniform suspension is determined by use of the McFarland² standards and diluted with a sufficient amount of the formaldehyde-salt solution to produce a density of 75 times No. 1 of the McFarland scale. In adding the required amount of formaldehyde-salt solution, allowance is made for the addition of a 1 per cent solution of crystal violet in such proportion that the final product will contain 3 cc of the 1 per cent crystal violet solution in each 100 cc. After being mixed, the antigen is allowed to stand 24 hours before use. A limited number of observations has indicated that a density of 50 times No. 1 of the McFarland scale is probably sufficient but most of the writers' experience has been with the denser solution.

Stained antigens prepared as described above have good keeping quality. Several lots that were kept for six months without refrigeration were in good condition at the end of that time, and two lots, kept without refrigeration for one year, have shown little change in sensitiveness. The deep staining of the bacteria appears to be a distinct advantage. It permits the use of a white background as a contrast to the stain on the bacteria. The reflecting power of a white background makes the reading of the test less difficult and the violet-colored clumps of the agglutinated bacteria stand out in sharp contrast to the red blood cells. The crystal violet also aids in the preservation of the antigen.

Two methods of carrying out the test have been used. One, essentially that described by Bunyea, Hall and Dorset, will be referred to as the smear method; the other, referred to as the

loop method, has been developed to insure more accurate measurement of the blood and thus overcome objections raised by some against the smear method.

THE SMEAR METHOD

The test, using the smear method, is conducted as follows: A drop of blood is secured by pricking the large wing vein near the point where it crosses the ventral side of the elbow joint, using a surgical needle or other suitable sharp instrument. A drop of blood is then collected on the end of a microscope slide and a blood smear about two inches long and one inch wide is made on a clean pane of glass. The thickness of the smear should be varied according to the weather conditions; in hot windy weather, for example, the smears should be made relatively thick to prevent too rapid drying.

In general the smears should be considerably thicker than blood smears made for microscopic study. To accomplish this the slide should be pushed very lightly over the surface of the pane of glass. One drop of stained antigen is immediately placed on the smear by means of a medicine-dropper. The glass plate is rocked from side to side a few times to mix the antigen and blood thoroughly, and to facilitate agglutination. The reaction is usually visible in from 5 seconds to 2 minutes. Slight reactions, which require more than 2 minutes, should as a rule be disregarded.

Various degrees of reaction are observed in this as in other agglutination tests. The greater the agglutinating power of the blood the more rapid the clumping and the larger the clumps. A positive reaction consists of a clumping of the antigen in well-developed violet flocculi surrounded by clear spaces. This reaction is easily distinguished against a white background. A somewhat weaker reaction consists of small but still clearly visible clumps of antigen surrounded by spaces only partially clear. The interpretation of these partial reactions should be the same as that of similarly incomplete "tube method" agglutination reactions. Between this point and a negative reaction there sometimes occurs a very fine granulation barely visible to the naked eye; this should be disregarded in making a diagnosis.

The very fine marginal flocculation which may occur just before drying up is also regarded as negative. In a non-reactor the smear remains homogeneous. A glass plate about 15 inches square providing space for 48 tests has proved satisfactory for

this work. The use of the plate enables the tester to have a number of successive test mixtures under observation without holding up the work to wait for results before proceeding to the next bird. As a result of more than a year of experience in testing with this antigen, it has been decided to regard as definitely positive only those reactions which appear within one minute after mixing the antigen and blood, while those which appear more slowly are regarded as suspicious.

THE LOOP METHOD

The loop method is carried out as follows: At the end of a $2\frac{1}{2}$ -inch length of nichrome wire (Brown and Sharp gauge No. 24) a loop $\frac{3}{16}$ inch in diameter is made. For convenience the wire is inserted into a small cork stopper which serves as a handle. It has been found that the blood can be measured rapidly and with sufficient accuracy by use of the wire loop. Such a loop when filled with blood, so that the blood appears to bulge out, delivers 0.02 cc. The antigen is measured by means of a medicine-dropper whose tip is adjusted to deliver 0.05 cc when operated in the vertical position. By this means, the proportion of antigen to blood is kept between the limits of 2 to 1 and 3 to 1, which has been found to give the most satisfactory results. A drop of stained antigen is placed on the glass plate. A loopful of blood is taken up from the wing vein. When submerged in the blood and then carefully withdrawn, the loop comes away properly filled. On looking down edgewise at the filled loop, one observes that the blood appears to bulge out. The loopful of blood is then stirred into the drop of antigen and the mixture spread to a diameter of about one inch. The loop is then rinsed in clean water and dried by touching it to a piece of clean blotting paper, if necessary. The test is observed as usual, although it is not necessary to continue mixing by rocking and tilting the plate as in the case of the smear method.

During the past two years the writers have made comparative tests of the rapid whole-blood method, using stained antigen, and of the tube method. The results were checked in some cases by bacteriological examination at autopsy. Results of this work indicate that the new stained antigen is a reliable diagnostic agent. For more extensive tests this antigen was also submitted to interested investigators in various parts of the country. The favorable comments received as a result of these coöperative efforts, together with their own experience, have led the writers

to publish this brief announcement in the hope that it may stimulate further critical examination of the diagnostic value of the new antigen.

The writers do not advocate that the tube agglutination method be discarded, until large-scale use of this new simplified method by a number of different men has firmly established its superiority. The tube method, though it has its drawbacks, has for the most part given good results in controlling losses from pullorum disease.

SUMMARY

A new antigen has been developed for use in the rapid whole-blood agglutination test for pullorum disease. It is sterile, has good keeping quality, and the bacteria are stained a deep violet. Reactions are easily distinguishable against a white background.

The antigen consists of a suspension of *Salmonella pullorum* in 0.85 per cent sodium chlorid solution, adjusted to a turbidity 75 times that of Standard No. 1 of the McFarland scale, killed and preserved by the addition of 1 per cent liquor formaldehydi, U. S. P., and stained by the addition of 0.03 per cent crystal violet.

The test may be made by mixing one drop of the antigen with a rather heavy blood smear on a glass plate.

A more precise method is to measure 0.02 cc of blood in a wire loop, and mix this on a glass plate with 0.05 cc of the antigen.

The stained antigen for the rapid whole blood agglutination test for pullorum disease deserves extended field trial.

ACKNOWLEDGMENTS

The writers wish to thank Dr. M. Dorset for his advice and deep interest in this work, and also the coöperators for their reports, comments and interest shown in testing the value of this new antigen.

REFERENCES

- ¹Bunyea, H., Hall, W. J., and Dorset, M.: A simplified agglutination test for pullorum disease. Jour. A. V. M. A., lxxv (1929), n. s. 28 (4), pp. 408-410.
²McFarland, J.: Nephelometer: An instrument for estimating the number of bacteria in suspensions used for calculating the opsonic index and for vaccines. Jour. Amer. Med. Assn. xlix (1907), 14, pp. 1176-1178.

Offices Abolished

The office of county veterinarian was abolished by the Board of Supervisors of both Carroll and Stephenson Counties, Illinois, at the June meetings of the respective boards. Dr. W. L. Coleman (Chi. '19) was Carroll County Veterinarian and Dr. G. N. Cunningham (Chi. '18) held the office in Stephenson County.

A FIELD TEST FOR PULLORUM DISEASE*

Preliminary Report

By D. R. COBURN, *Michigan Bureau of Animal Industry,*
and H. J. STAFSETH, *Department of Bacteriology,*
Michigan State College, East Lansing, Mich.

The advantages of an accurate, rapid test for the diagnosis of pullorum disease in poultry are manifold.

Since the development of the rapid agglutination test for Bang's disease, by Huddleson and Abell, in 1928,¹ the possibilities of the application of a similar test for the diagnosis of other diseases, which may be detected by the agglutination test, have been evident.

In 1929, Bunyea, Hall and Dorset² described such an adaptation of this test to pullorum disease, using the whole blood, by which the selection of healthy birds could be made from a diseased flock with one handling and with the elimination of the doubtful reactors frequently encountered in the slow test. In this field test, a specially constructed box was used for making the readings and dependence was placed on a gross clumping of the organisms in detecting reacting birds. The feature of special merit in this test was the use of *whole blood* instead of serum, thus making it a test easily applied in the field.

In an attempt to simplify and improve the mechanical features of the test further and to make finer distinctions in the reading of doubtful reactions, work was started by the authors, in September, 1930.

With minor changes in the procedure as outlined by Huddleson and Abell, an antigen was prepared for use with whole blood which showed very close agreement with the tube method in dilutions higher than those commonly used in the slow test, when compared in repeated tests of a large number of samples from commercial and Michigan State Experiment Station flocks. This close agreement in the low dilutions and the high sensitiveness indicated that finer distinctions were possible with this method than with the slow test, which fact was borne out in the culture work conducted on postmortem.

The previously mentioned variations from the Huddleson-Abell method of preparing the antigen consisted of using a more

*Received for publication, July 25, 1931.

concentrated antigen and an increased amount of dye, in addition to that needed as a preservative, for the purpose of deeply staining the suspended organisms. For contrast with the dye used for coloring, a white porcelain plate was substituted for the clear glass plate, which also eliminated the necessity of an artificial light or other special lighting arrangement.

PREPARATION OF ANTIGEN

Three strains of *Salmonella pullorum*, having good agglutinating qualities, were used as cultures and grown on veal-chicken infusion agar (pH 7.2) for 72 hours at 37.5° C. The resulting growth was washed off with a small quantity of normal saline, containing 0.5 per cent phenol. The dyes used for preserving and staining were gentian violet and brilliant green (1 cc of a concentrated alcoholic solution of gentian violet and 5 cc of a 1:1,000 solution of brilliant green for each 100 cc of the suspension). Standardization was accomplished by comparison of reactions, determined by slow agglutination reactions, using birds of known serum titre.

To insure constancy in the measurement of antigen and blood, standardized dropper-pipettes of equal delivery capacity were used. The use of two or more pipettes, rinsed between samples in the case of the blood measurement, facilitated rapid work.

The technic of the test consists of the mixing, with a clean tooth-pick, of equal measured quantities (single drops) of whole fresh blood and antigen on the porcelain plate and the reading made in from one to three minutes. (A demonstration of this test was made before the Michigan State College Short Course for Veterinarians, at East Lansing, January 28, 1931.)

A flock of thirty pullets, of which twelve showed a natural pullorum infection, was used for test purposes. Four tests (both rapid and slow) for check purposes were made at two-week intervals (October 18, November 5, November 19, and December 5, 1930). During this time, several birds were lost as a result of other diseases and by the 75th day, so few were left, that those remaining (except two negatives) were killed. All birds were given a postmortem examination and the livers, intestines and ovaries cultured.

Of the twelve birds marked positive by the rapid test, *S. pullorum* type A or B was recovered on postmortem from eleven cases, of which only nine were positive with the slow test as shown in table I. The six doubtfuls were cloudy reactions.

TABLE I—*Summary of four tests and culture findings in thirty birds*

READINGS	AGGLUTINATION TESTS		BACTERIOLOGICAL EXAMINATION AT POSTMORTEM
	RAPID	SLOW	
Negative	18	15	16—
Positive	12	9	11+
Doubtful	0	6	
Totals	30	30	27*

*Three negative birds not examined.

SUMMARY

The use of a rapid agglutination test, employing whole blood, is practical as a field test for pullorum disease. Three improvements in the technic of the rapid test are here reported:

1. A highly stained (gentian violet) antigen.
2. A white porcelain plate for a contrasting background, thereby eliminating the necessity of artificial lighting.
3. Standardized pipettes for delivering accurate quantities of blood and antigen.

ACKNOWLEDGMENT

We wish to acknowledge the assistance of Dr. W. W. Thompson in the conduct of the slow tests.

REFERENCES

- ¹Huddleson, I. F., and Abell, E.: Rapid microscopic agglutination for the serum diagnosis of Bang's abortion disease. *Jour. Inf. Dis.*, xlii (1928), (3), pp. 242-247.
- ²Bunyen, H., Hall, W. J., and Dorset, M.: A simplified agglutination test for pullorum disease. *Jour. A. V. M. A.*, lxxv (1929), n. s. 28 (3), pp. 408-410.

Prominent Visitors at the Journal Office

Three prominent veterinarians from foreign countries have made visits to the JOURNAL office during recent months. The first of these was Dr. Kurt Wagener, of the Hygienischen Institut der Tieraerztlichen Hochschule, Berlin, Germany. A short time later, Major G. W. Dunkin, of the National Institute for Medical Research, Mill Hill, England, paid his respects at the office. More recently, Dr. Sima Debelic, of the Hygienic Institute, Zagreb, Jugoslavia, called for the purpose of getting some statistics and other information concerning the veterinary profession in America.



CUTANEOUS AND SUBCUTANEOUS TUBERCULOSIS IN A TURKEY

By L. H. SCRIVNER and CECIL ELDER

University of Wyoming, Laramie, Wyoming

Several references to cutaneous and subcutaneous tuberculosis in fowls are to be found in reviewing the literature, but no specific cases of cutaneous tuberculosis in turkeys appear to have been reported. Its occurrence is undoubtedly rare, although several cases have been reported in chickens, pigeons and parrots.

Ward and Gallagher,¹ although not specifically mentioning turkeys, state that "tubercular skin lesions in fowls may consist of single spherical masses each surrounding the root of a feather or more often consist of larger masses."

They also report a form of nodular disease of the skin in which tuberculosis-like organisms are to be found, but which are not acid-fast in their staining reactions, neither will they grow. They complete their statement by saying that "unquestionably tuberculosis lesions of the skin appear in pigeons, and that a horny cutaneous lesion is relatively common in the parrot."

Van Es and Schalk² reported, in 1914, that of 126 cases of avian tuberculosis they failed to find the cutaneous form. They made no mention of the disease in turkeys.

Hutyra and Marek³ state, in describing tuberculosis of fowls, that in rare instances small painless nodules develop in the subcutaneous connective tissue. At a later stage they may ulcerate. They state also that Day observed pronounced thickening of the skin in which bean-sized homogeneous or caseous nodular foci were embedded. The skin affection either extended over the entire rump, or was confined to small areas. These authors make no specific mention of the disease in turkeys.

Received for publication, May 11, 1931.

Edwards⁴ reports finding cutaneous lesions of tuberculosis in fowls in 6.52 per cent of cases examined. However, the total number of cases was not given. Moore and Ward⁵ report 5.88 per cent cutaneous infection in a total of 17 cases of tuberculosis in fowls.

Following this discussion we wish to report a case of generalized tuberculosis in a turkey which was characterized by large numbers of cutaneous lesions.

About January 7, 1930, our attention was called to the carcass of a turkey which had been sold after it had been prepared for the holiday market. The turkey had been dressed and sold to a customer through a local concern. The customer, noticing a large number of hard, wart-like lesions of the skin, became a little cautious and called the poultry husbandman of the Uni-

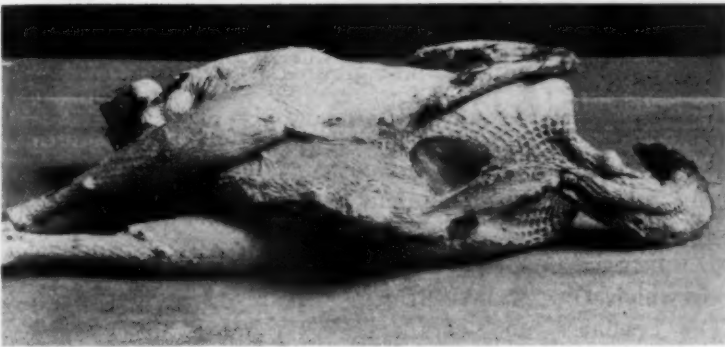


FIG. 1. Carcass showing several cutaneous and subcutaneous lesions

versity of Wyoming. Upon seeing the turkey he removed several of the nodules and brought them to the laboratory for a diagnosis. Acid-fast stains were made of the material and numerous acid-fast organisms were found to be present.

The customer, upon learning of the diagnosis, gladly turned the carcass over to us, after being informed by the local dealer that the bird would be replaced.

The carcass, upon examination, appeared to be that of a turkey in fair condition. There were approximately 40 to 50 small hard nodules on the skin, varying in size from one to ten millimeters in diameter. All of them were very hard, being rather granular on the interior but showing no pus. The nodules were found over the sides of the body and on the neck.

On January 13, one of the nodules was removed from the skin with sterile instruments and immersed in boiling water for a few seconds. Then with a sterile scalpel the nodule was cut through the center and from the freshly cut surface, glycerinated potato media and Loeffler's blood-serum agar were inoculated.

About a half-dozen other nodules were removed in the same manner and after being subjected to hot water for a few seconds were ground up with 3 cc of sterile physiological salt solution in a sterile mortar. The resulting fluid suspension was then injected intraperitoneally in 0.1-cc amounts into a rabbit and a guinea pig.

The carcass was then opened and practically the entire abdominal viscera, including the mesentery and peritoneum, were studded with abscesses, varying in size from a millimeter to three centimeters in diameter. Upon microscopic examination these abscesses revealed large numbers of acid-fast organisms. The thoracic cavity proved to be free from lesions and no acid-fast organisms could be demonstrated. Externally the carcass appeared in fair condition and contained relatively large amounts of fat internally.

At the end of four months, a small, round grayish colony was noticed on the glycerinated potato medium. Staining of the colony revealed acid-fast organisms. About two weeks later, several other colonies developed which appeared to be identical with the first. Although not all of these were stained, the five or six which were, showed acid-fast organisms.

The Loeffler's blood-serum agar did not at any time show growth although it was kept in the incubator at 37° C. for over ten months.

On June 18, the rabbit which had received 0.1 cc of the suspension of the cutaneous nodules died. Upon autopsy a large grayish mass of necrotic material, the size of an English walnut and consistency of putty, was found subcutaneously at the point of injection. The kidneys, spleen and intestines showed large numbers of grayish necrotic abscesses varying in size from a pin-head to that of a pea. One abscess about the size of a pea was found in the lungs. Several of these lesions were stained and each showed large numbers of acid-fast organisms.

Morphologically, the organisms resembled the avian tubercle bacillus, as described by Calmette⁶ and others, being rather elongated, straight and curved. A great many were found which took a granular stain. Consequently it was assumed that the organism with which we were dealing was the avian type and

the fact that the rabbit died of generalized tuberculosis, whereas the guinea pig failed to show symptoms, and at the end of eleven months was still healthy, would seem to bear out this assumption.

REFERENCES

- ¹Ward, A. R., and Gallagher, B. A.: *Diseases of Domesticated Birds* (MacMillan Co., New York, 1926.)
²Van Es, L., and Schalk, A. F.: Avian tuberculosis. N. Dak. Exp. Sta. Bul. 108 (1914).
³Hutya, F., and Marek, J.: *Special Pathology and Therapeutics of the Diseases of Domestic Animals* (2nd ed., Alexander Eger, Chicago, 1922).
⁴Edwards, P. R.: Tuberculosis of fowls. Ont. Agr. Bul. 193 (1911).
⁵Moore, V. A., and Ward, A. R.: Avian tuberculosis. Proc. A. V. M. A. (1903), pp. 169-182.
⁶Calmette, A.: *Tubercle Bacillus Infection and Tuberculosis in Man and Animals* (Williams & Wilkins Co., Baltimore, 1923).

VOLVULUS OF SMALL INTESTINE OF A TWO-WEEK-OLD BELGIAN FOAL

By J. F. BULLARD, *Lafayette, Ind.*

Department of Veterinary Science, Purdue University Agricultural Experiment Station

Due to the large amount of intestine included in this volvulus and its occurrence in such a young foal, the case was thought to be of sufficient interest to be reported.

This foal was born with an enlarged right stifle and hock. It was also somewhat sluggish, spending most of its time lying

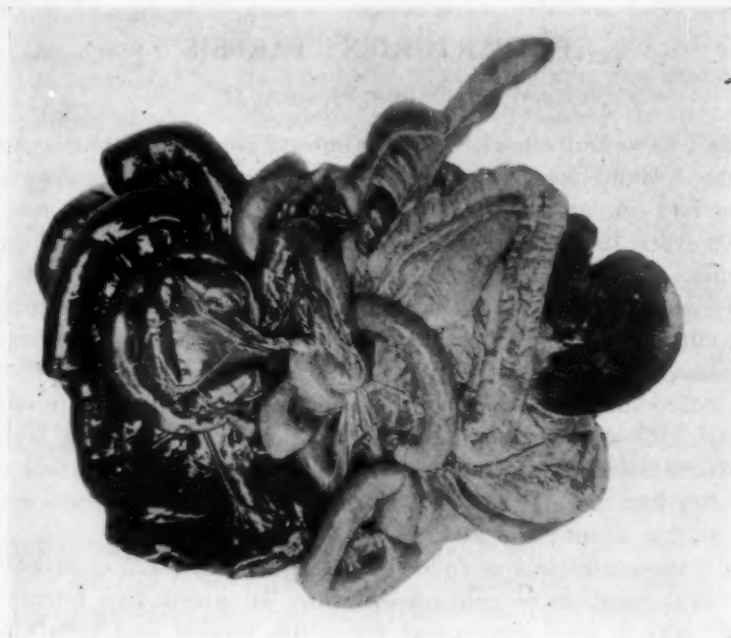


FIG. 1. Dark section at left shows involved portion of intestine and mesentery

down, and had to be helped to its feet for nursing. At two weeks of age, the enlarged joints were somewhat smaller than at birth and the general condition of the colt was improved. At this time the attendant reported that the foal died very suddenly.

The autopsy revealed an extensive volvulus which included approximately two-thirds of the small intestine. The total length of the intestine, from stomach to cecum, measured thirty-one feet. Of this, the first nine feet and the last two feet were the only parts not affected. The remaining twenty feet showed the characteristic black color. About a quart of sero-sanguineous exudate was present in the peritoneal cavity. The visible mucous membranes and serous membranes were badly congested. Various joints were opened and examined. All appeared normal with the exception of the joint fluid, which was somewhat darker than the usual color. Bacteriological cultures were made but no growth developed on the media.

Figure 1 shows the completeness of the twisted portion of the mesentery and intestines. The black section of the intestines (left) shows a distinct contrast with the normal portion which appears to the right of the twisted section.

PREPARTURIENT PARESIS

By W. O. OGDEN, Hominy, Okla.

As I have had some little experience in something that is new to me, I would like to know if any other members of the profession have had similar cases.

On April 19, I was called to see a cow belonging to one of my clients. On arrival, I found the cow down and unable to rise. The owner informed me that the animal had been down during the entire night, and he said that he had made several efforts to assist her to rise but that she could not stand.

I noted that the pupils were dilated and the temperature was 99° F. There were no indications of the bowels having been evacuated during the night. I inquired of the owner whether the cow had recently calved. He informed me that she was due to calve in about 30 or 40 days.

My treatment was as follows: I administered 125 cc of a 20 per cent solution of calcium chlorid. In about five minutes there was a good movement from the bowels and in about fifteen minutes she got up and walked off. The owner has just

informed me that she was getting along fine and he was expecting her to calve almost any time. I am convinced, by this experience, that a cow can have milk fever some time before calving. This may not be an unusual occurrence for some, but it certainly is for me. I have had a few cases of milk fever just a day or so before calving, but never as long as 30 or 40 days prior to parturition.

ATYPICAL CASES OF MASTITIS

By JAMES K. STROCKBINE, Bedford, Pa.

Recently I was called to see two cases of mastitis in dairy cows, the same day. The two cases were similar in many respects, but neither case was typical of most cases of mastitis as I find them. I usually find that the typical case has a much higher temperature, shows more depression and the udder generally is

TABLE I—Data on two atypical cases of mastitis

	CASE 1	CASE 2
Breed	Grade Holstein	Grade Holstein
Age	About 6 years	About 8 years
Period of lactation	Due to freshen in about 6 weeks	Had been fresh about 6 weeks
Previous attacks	None	Unknown. Since freshening one quarter slightly affected.
Feed before attack	Pasture	Pasture
Appetite after attack	Poor for grain. Eats grass	Poor for grain. Eats grass
Duration of attack when first seen	2 days	2 days
Parts of udder affected	All four quarters. Left front and right hind quarters were worse	Two hind quarters
Palpation of udder	Affected quarters slightly swollen and hard. No heat	Affected quarters slightly swollen and hard. No heat
Udder secretion	Many stringy yellow clots. Yellow serum-colored liquid	Yellow chunks. Mostly yellow serum-colored liquid
Temperature	100.5° F.	101.0° F.
Attitude	Bright. Down and unable to get up	Slow stiff walk. Some difficulty in getting up

greatly swollen and very hot, especially when the udder secretions are like those found in the two cases here reported. No laboratory examination of the udder secretions was made. I am wondering if both of these cases were caused by the same organism. Table I summarizes the two cases.

MULTIPLE PERIARTHRITIS AND PERIARTICULAR FIBROSIS

By GERRY B. SCHNELLE, *Boston, Mass.*

Angell Memorial Hospital

Subject: A six-year-old Scottie.

History: Swellings apparent at the tibial, tarsal and carpal joints, eight months previous to examination. The swellings were not painful at all times but increased in extent until they involved the knees and the phalangeal articulations.

Postmortem: The dog was destroyed and the following post-mortem changes were found: Edema and congestion of the lungs and congestion of the liver (part of which may have been caused by euthanasia with chloroform).

The involved joints were tremendously enlarged as compared with the bones which entered into them. There was no periosteal involvement. There was a tremendous thickening and induration of the joint capsule at the knee joint, which was taken for detailed examination. The layers forming the joint capsule were unusually adherent, so that the usual cleavage planes were no longer present. The articular cartilages were normal.

Histopathology: Microscopic examination of the joint capsule and prepatellar fat showed a considerable increase in the connective tissue of the capsule, whereas the fat pad was not involved. The etiology was not clear from microscopic study. The connective tissue was edematous in places and there was evidence of new connective tissue formation as well as an over-abundance of old scar tissue. Throughout the thickened capsule there was a diffuse scattered infiltration of inflammatory cells, consisting of mononuclear phagocytes, lymphocytes and polymorphonuclear leucocytes. The inflammatory cell infiltration was most marked around the blood-vessels. In occasional areas there was inflammatory cell infiltration, these foci being so scattered that only two or three were found in one complete section of the joint capsule. There were no lesions which suggested tuberculosis and the cause of this diffuse inflammatory process and fibrosis is still a mystery. The synovial membrane appeared normal.

A guinea pig inoculated with a fragment of the involved joint capsule remained well and at postmortem, six weeks later, showed no lesions in any part of the body.

This pathological study was of particular interest to the writer because of a previous belief that this type of joint enlargement was tubercular.

The writer is indebted to Dr. G. A. Bennett, of the Harvard Medical School, for the pathological work and report.

CARBON TETRACHLORID AS A PARASITICIDE

By HENRY L. HIRSCHER, *New York, N. Y.*

The following may be of interest to members of the profession who have work with small animals and who have had no previous experience with carbon tetrachlorid as a parasiticide:

Animals infested with fleas or other kinds of vermin may be practically rid of these infestations with one rubbing of a preparation having carbon tetrachlorid as a base.

By saturating a piece of cotton or sponge with a little of this preparation and rubbing it over the coat briskly, I can safely state that every parasite will be destroyed, without the danger of spreading them all over the house. The hopping off of fleas, especially when any parasiticide is used, is entirely eliminated.

The danger of poisoning, even in cats, is not apparent from my experience with the use of this method. I really did fear it at the beginning, but now I use this method indiscriminately in treating small animals. It may be used by anyone, even to rid the smallest puppy or kitten of fleas or other vermin. The action is immediate.

BRUCELLA INFECTION IN A DOG*

By J. F. PLANZ, *Akron, Ohio*

Akron Veterinary Hospital

and I. FOREST HUDDLESON, *East Lansing, Mich.*

Michigan State Experiment Station

On February 12, 1931, a male fox terreir, three and one-half years old, was brought to the hospital for examination. The owner stated that the dog had appeared listless and languid for the past six weeks. The severity of these symptoms varied from day to day. The appetite had been good. No vomiting or diarrhea had been observed. The diet had consisted largely of raw meat. Raw milk was fed occasionally.

Physical examination: Temperature, 105.8° F.; pulse, 100; the rear legs are stiff and painful; right testicle is swollen to twice

*Received for publication, July 21, 1931.

normal size. Held for further examination. February 15, 1931—Temperature, 103.0° F.; pulse, 108. Rapid agglutination test for *Brucella*; reaction complete in 1:500 dilution. February 20, 1931—Temperature, 103.8° F.; pulse, 110. February 21, 1931—Temperature, 104.0° F.; pulse, 120. February 21, 1931—Right testicle removed. There appears to be an abscess in the testicular tissue. The cord is indurated through the inguinal ring. An incision made into the tissue of the testicle reveals an abscess in the cortex about 5 x 15 mm. in diameter. It is filled with a sanguinolent pus of about the consistency of 20 per cent cream. From the pus an organism was isolated aerobically in pure culture which, on further study, was found to be *Brucella suis*.

February 24, 1931—The temperature of the dog is 102.6° F.; pulse, 115. The appetite is good. The rear legs are not so stiff. February 24, 1931—The temperature is 101.9° F. The operation wound is almost healed. There is no discharge; appetite is good. Stiffness and lameness have disappeared. The dog is now very active. March 22, 1931—The operation wound has healed completely. The dog appears normal. The agglutination reaction is still positive in a 1:500 dilution.

It is of interest to note that this is the first reported isolation of the genus *Brucella* from the canine species.

Dean Giltner Honored

On Friday, June 12, 1931, the members of the Department of Bacteriology and Hygiene of Michigan State College migrated to Park Lake, where a picnic was held in the nature of a surprise party for Dr. Ward Giltner, who has been connected with the institution for 23 years, part of the time in the capacity of Professor of Bacteriology and during recent years as Dean of the Division of Veterinary Science.

Dean Giltner is planning to spend a large part of the next college year at the University of Michigan, Ann Arbor, for the purpose of completing work for the degree Doctor of Public Health. On the occasion of the picnic, the members of his staff presented him with a beautiful Gladstone travelling bag. For the first time in his career, Dean Giltner was rendered speechless. He was actually unable to utter a single word. However, it is reported that after he had had some time for sleep and acquiring some much needed rest, he acknowledged that he had been surprised into complete speechlessness. Believe it or not.

ABSTRACTS



THE PATHOLOGICAL CHANGES FOLLOWING EXPERIMENTAL EXPOSURE OF DOGS TO MYCOBACTERIUM TUBERCULOSIS OF AVIAN ORIGIN. William H. Feldman. Amer. Jour. Path., vii (1931), 2, p. 147.

A histopathological study was made of the tissues obtained from dogs which had been infected with bacilli of avian tuberculosis. In six dogs infected by injection into the brain, definite tuberculous lesions were found in the brain and liver in every instance; the spleen of one animal and the lungs of every animal escaped demonstrable infection. Lesions in dogs injected intravenously were sharply limited to the liver. The author emphasizes the significance of the susceptibility of organs in the pathogenesis of tuberculosis. Most of the lesions were progressive and necrosis was not common. The lesions induced were essentially circumscribed or diffuse accumulations of monocytic cells. Giant cells were absent. Attempts to establish an infection in the dog by other means bring out the fact that the dog possesses an extremely formidable constitutional resistance to this form of the disease.

BRUCELLA ABORTUS IN RELATION TO MAN IN IRELAND. Joseph W. Bigger. Irish Jour. Med. Sci., sixth series, lxiv (1931), p. 150.

Only three cases of undulant fever have been described in Ireland, a country of 4,000,000 population. Epizootic abortion is a common disease among cows in this country. *Brucella abortus* is often found in samples of raw milk. Since the greater portion of the milk consumed in Ireland is raw, the author advances the explanation that the three following factors may be involved: First, that there has been lack of sufficient search for cases; second, that there may be an unusual human resistance in Ireland against *Br. abortus*; and, third, that there may be a low virulence for man of the Irish strains of *Br. abortus*. The author advances the theory that there may be an inherited immunity in young

children and that the almost universal use of raw milk in Ireland may lead to the development of an active immunity in the growing child before the inherited immunity disappeared. The most probable explanation of the rarity of undulant fever in Ireland is that the virulence for man, of the organisms present in this country in cows, is low. Norris has observed that the strains isolated are of low virulence for the guinea pig and also that the porcine strain has never been found in Ireland.

ANOPHELES MOSQUITOES AND AVIAN MALARIA. Paul F. Russell. Amer. Jour. Trop. Med., xi (1931), 2, p. 145.

Culex fatigans and *Aedes aegypti*, under conditions of the experiment, will feed freely on canaries kept continuously in the same boxes. Experiments over a period of six months in Manila and Boston have demonstrated this. Anopheles mosquitoes under similar conditions will not take blood from canaries. Observations failed to reveal evidence that avian malaria is transmitted by Anopheles mosquitoes. Such mosquitoes the author observed preferred starvation to blood obtained directly.

SEARCH FOR A BRUCELLA BACTERIOPHAGE. Ronald Gwatkin. Jour. Inf. Dis., xlviii (1931), 4, p. 404.

Five samples of feces from infected and four from uninfected cows, nine samples of milk from infected and four from uninfected animals, one infected fetus, uninfected twin fetuses, six apparently normal fetal membranes and three samples of blood from infected cattle were examined for the presence of a lytic agent by methods that have proven successful in the isolation of *S. pullorum* bacteriophage. There was no evidence of bacteriophage in the material examined. Poor growth or absence of growth on the surface of liver-agar seeded with *Br. abortus* was shown to be due to water of condensation on the medium. No lytic agent could be demonstrated in the clear or in the partially inhibited areas. Attempts to lyse *Br. abortus* with *S. pullorum* bacteriophage were unsuccessful.

THE EFFECT OF KILLED CULTURES AND FILTRATES OF BRUCELLA ABORTUS IN THE PREVENTION OF INFECTION IN GUINEA PIGS. Ronald Gwatkin. Jour. Inf. Dis., xlviii (1931), 4, p. 381.

Infection produced in the guinea pig by feeding a suspension of *Br. abortus* and also by instilling one drop into the eye pro-

duced lesions similar to infection produced by intraperitoneal injection. The injection of killed suspensions and filtrates of *Br. abortus*, subcutaneously and intraperitoneally, resulted in titres which did not exceed 1:500. The titres produced with some of the filtrates were low. The sera of these animals, however, were shown to have as high complement-fixing qualities as those of the animals treated with the bacterial suspensions. Attempts to immunize groups of guinea pigs treated with heated suspensions and with the unheated filtrate resulted in the development of well marked lesions in both groups when the guinea pigs were later exposed to infection. In another experiment these latter results were demonstrated more conclusively. When ground bacterial extract and suspension was used, the results were not so clear cut, but all animals showed changes in the spleen and *Br. abortus* was recovered from this organ in all cases. The use of a formaldehydized suspension showed no evidence of protection from thirty injections.

CORRELATION OF OCCUPATION WITH SEROLOGIC REACTIONS FOR BRUCELLA ABORTUS. Axel Thomsen. Jour. Inf. Dis., xlviii (1931), 5, p. 484.

Of sixty-five veterinary surgeons in rural practice for more than one year, 61 showed positive reactions. The results of complement-fixation tests were far more frequently positive than those of agglutination tests. An entire class of young veterinarians, tested before their final scholastic examinations, showed no reactions. An entire class (18) were examined five months after leaving school; 15 reacted in titres equal to those in cases of undulant fever. Only one had clinical undulant fever. A third class of twelve, examined a year after leaving school, gave reactions correlating with the preceding group. Those who did not give reactions were not handling cattle. Ten of sixteen bacteriologists working with *Brucella* gave positive reactions. Thirteen of twenty-one chief cattle attendants at farms where contagious abortion existed showed positive reactions. Six of twenty-five lesser employes in similar work at these farms showed positive reactions. Nine of twenty-three owners of such farms gave positive reactions. One of twenty milk-maids at similar farms gave a positive reaction. No reactions were noted among ten milk tasters of large Copenhagen dairies. One of five inspectors of milk and stables gave a positive reaction. He had formerly engaged in rural practice. Five of twenty-five butchers were

found to give positive reactions. Inspecting veterinarians at slaughterhouses showed four positive serums in 12 examined. All four had formerly practiced among cattle.

ANTIGENIC VALUE OF BOTULINUM TOXOIDS KEPT ONE YEAR AT ICE BOX TEMPERATURE. Robert Graham. *Jour. Immunol.*, xx (1931), 4, p. 305.

An antigenic decline in botulinum toxoids of 30 to 60 per cent over a period of 1 to 12 months was measured by the increased number of arbitrary units required to protect guinea pigs against lethal amounts of homologous toxins. Seven of eleven samples of botulinum toxins A, B and C, containing 0.3 to 0.9 per cent formalin, became detoxified at 37 to 42° C. in one month. The remaining four of eleven samples required 2 to 5 months for detoxification. Ten of eleven toxoids were atoxic and antigenic in two-unit doses at 10 to 12 months of age. The rate of detoxification in botulinum toxoids by formalin and heat seemed uncorrelated with the longevity of the antigenic properties. The pH of eleven botulinum toxoids changed from an original titre of pH 7.6 in the inoculated media to an average of pH 6.7 in six and one-half months.

A METHOD FOR UNIFORM STIMULATION OF THE SALIVARY GLANDS IN THE UNANESTHETIZED DOG BY EXPOSURE TO A WARM ENVIRONMENT, WITH SOME OBSERVATIONS ON THE QUANTITATIVE CHANGE IN THE SALIVARY FLOW DURING DEHYDRATION. Magnus I. Gregerson. *Amer. Jour. Physiol.*, xcvii (1931) 1, p. 107.

Uniform stimulation of the salivary glands in the unanesthetized dog may be obtained by exposing the animal to a warm atmosphere of constant temperature, thereby producing always the same rate of panting (polypnea). As panting dries the mouth and tongue, the salivary glands are reflexly stimulated to secrete a thin, watery saliva which may appropriately be called the "polypnea secretion." Spraying with water, as the dog's mouth is held closed, promptly lessens the polypnea secretion. On a normal water intake the polypnea secretion remains nearly the same from day to day but after 24 hours without water it is greatly reduced. In a warm room, with a temperature of 40° C., the secretion reaches a definite level within 10 to 15 minutes and has been observed to stay constant for over two hours.

RELATION OF *BALANTIDIUM COLI* INFECTION TO THE DIET AND
INTESTINAL FLORA OF THE DOMESTIC PIG. Eugene Schu-
maker. Amer. Jour. Hyg., xiii (1931), 2, p. 576.

Heavy infections with *Balantidium coli* in the domestic pig were accompanied generally by an intestinal flora which contained greater numbers of aciduric organisms and lesser numbers of lactose fermenters and proteolytic anaerobes. The converse also was true. The author places little significance in the fact that high infections with *Balantidium coli* were accompanied by a very slightly more acid reaction of the cecal content. Large amounts of starch were found in the ceca of pigs which had heavy infections with *Balantidium coli*. Heavy infections of *Balantidium coli* in the pig were accompanied by a diet high in carbohydrate in the form of grain. This was manifested by the nature of the intestinal flora and by the presence of undigested carbohydrate in the immediate environment of the parasite.

INTESTINAL PARASITES IN THE TURKEY. Ismail Hakki. Abst.
Trop. Dis. Bul, xxviii (1931), 3, p. 176.

The turkeys examined numbered 600. The technic consisted of using plain and stained smears. The numbers of infection were: *Ascaris*, 223; *Trichuris*, 101; *Hymenolepis*, 53; "*Necator*," 2; *Enterobius*, 41; *Diphyllbothrium*, 6; *T. saginata*, 1; *Dipylidium*, 1. The percentages of protozoa found were: *E. histolytica* 3-8; 4-celled amoebic cysts, 8-2; *Giardia*, 4-0; *Tetramitus*, 2-0; *Trichomonas*, 3-9. Coccidia, balantidia and spirochetes were not found.

BACTERIAL GROWTH IN THE UDDERS OF LIVING COWS COMPARED
WITH THAT IN THE UDDERS FOLLOWING DEATH AND REMOVAL
OF THE BLOOD SUPPLY. H. R. Curran. Jour. Inf. Dis.,
xlvi (1931), 4, p. 408.

Some bacterial types maintained in the udders of living cows at a fairly constant numerical level multiplied with great rapidity immediately following the death of the cows and removal of the blood. Rapidly growing invasive types of streptococci were most affected. The flora of the udders of some cows did not increase appreciably during the postmortem incubation period. Relatively inert, slow-growing micrococci and streptococci usually comprised this group. The suddenly increased multiplication of the flora of the udders that frequently attends the withdrawal

of the blood suggests that the circulatory system is directly or indirectly associated with the formation of the bactericidal substance in milk.

THE ETIOLOGY OF INFECTIOUS DIARRHEA (WINTER SCOURS) IN CATTLE. F. S. Jones and Ralph B. Little. Jour. Exp. Med., liii (1931), 6, p. 835.

The authors describe a disease of cows manifested by severe diarrhea. The condition is characterized by the frequent passage of dark brown or black feces, often containing mucous and blood. The principal lesions are catarrhal inflammation of the small intestine and liver degeneration. By feeding feces from spontaneous cases to calves, a similar but milder disease characterized by the same type of enteritis was produced. Vibrios were cultivated from the inflamed intestinal tract of such experimentally induced cases. Pure cultures of the vibrios, when fed to other calves, in certain instances, produced diarrhea and a well-marked enteritis similar to that observed in both the spontaneous disease and in calves following the feeding of feces from naturally infected cows. Vibrios were recovered from the inflamed small intestine of three out of four animals fed such cultures.

Stop at Sedalia

The Missouri State Fair will be in full swing at Sedalia, during the week of the A. V. M. A. convention. The Veterinary Building at the Fair, sponsored by the Missouri Veterinary Medical Association, can be seen working to capacity by any visiting veterinarians who may stop at the Fair. You will be welcome.

Committee on Education

A meeting of the A. V. M. A. Committee on Education will be held in Room 208, at the Hotel Baltimore, Kansas City, Monday afternoon, August 24, 1931, at 2 o'clock, to consider uniform entrance requirements for veterinary colleges. It is hoped that every veterinary college in the United States and Canada will have a representative at this meeting. Any others who are interested in the subject of veterinary education are invited to attend.

N. S. MAYO, *Chairman.*



Regular Army

Major Isaac O. Gladish is assigned to duty at Fort Omaha, Nebr., upon completion of his present tour of foreign service, and, in accordance with orders to be issued by the commanding general, Panama Canal Department, will join that station and report to the commanding officer for duty as station veterinarian at that post and attending veterinarian, Fort Crook, Nebr., and in addition he will report to the commanding general, Seventh Corps Area, for duty at his headquarters.

Lt. Col. Alfred L. Mason is relieved from his present assignment and duties at Fort Sam Houston, Texas, effective in time to sail from New York City on transport scheduled to leave that port on or about October 22, 1931, for the Panama Canal Department.

Major Horace S. Eakins is relieved from duty at Fort Robinson, Nebr., at such time as will enable him to sail on transport scheduled to leave San Francisco, Calif., on or about August 29, 1931, for the Panama Canal Department.

Colonel William A. Sproule is relieved from his present assignment and duties at Fort Jay, N. Y., and will proceed to San Francisco, Calif., on transport scheduled to leave New York on or about July 17, 1931. Upon arrival Col. Sproule will report to the commanding officer, Presidio of San Francisco, for duty as station veterinarian, and in addition will report to the commanding officer, San Francisco general depot, for duty as port veterinarian, and to the commanding general, Ninth Corps Area, for duty at his headquarters.

Captain Stanley C. Smock, now on duty at Fort Hoyle, Md., is assigned, in addition to his other duties, as attending veterinarian at Fort Howard, Md., and Fort Geo. G. Meade, Md.

Captain Robert P. McComb, now assigned to duty at Fort Logan, Colo., is assigned in addition to his other duties, as attending veterinarian at Fitzsimons General Hospital.

Captain Samuel G. Kielsmeier is assigned to duty at Robinson quartermaster depot, Fort Robinson, Nebr., upon completion of his present tour of foreign service in the Panama Canal Department.

First Lt. John L. Owens is relieved from duty at Fort Sam Houston, Texas, effective in time to sail from New York City on transport scheduled to leave that port on or about October 22, 1931, for the Panama Canal Department.

Captain Lloyd C. Ewen is relieved from duty at Fort Howard, Md., effective on or about July 5, 1931, and will proceed to Fort Sam Houston, Texas, for duty.

Captain James L. Barringer is relieved from duty at Fort Bragg, N. C., in time to proceed to New York City and sail on transport scheduled to leave that port on or about October 22, 1931, for the Panama Canal Department.

Captain Sawyer A. Grover is assigned to Fort Leavenworth, Kans., effective upon completion of his present tour of foreign service in the Panama Canal Department.

The promotion of the following-named officers to the grade of Major is announced:

Captain Kenneth E. Buffin
Captain Robert P. McComb
Captain William R. Wolfe
Captain Chauncey E. Cook

Veterinary Reserve Corps

New Acceptances

Johnston, Elmer David.....	2nd Lt....	Pomona, Kansas
Love, Forrest Coniver.....	2nd Lt....	Erie, Kansas
Price, Clayton John.....	2nd Lt....	Osage City, Kans.
Price, Willet Jesse.....	2nd Lt....	R. F. D., Liberty, Kans.
Spangler, Don Harvey.....	2nd Lt....	Stanton, Nebr.
Suplee, Dale.....	2nd Lt....	Route 4, Council Grove, Kans.
Trull, Elliott Rodney.....	2nd Lt....	Padonia, Kans.
Bergman, Ralph Herman.....	2nd Lt....	Madison, Minn.
Bogaard, Kenneth.....	2nd Lt....	Orange City, Iowa
Cairns, Frederick Courtney.....	2nd Lt....	St. Johnsville, N. Y.
Crane, Douglas Belden.....	2nd Lt....	65 Grove St., Mount Kisco, N. Y.
Fischer, Sebastian Benedict.....	2nd Lt....	East Northport, L. I., N. Y.
Jones, Lloyd Diehl.....	2nd Lt....	Rochelle, Ill.
Knapp, John Wm.....	2nd Lt....	124 Union Rd., Roselle Park, N. J.
Legg, Asa Frank.....	2nd Lt....	Cincinnati, N. Y.
Marvin, Paul Dana.....	2nd Lt....	Almond, N. Y.
Morrison, Harold Loran.....	2nd Lt....	Gilmore City, Iowa
Penrose, Weston Boyd.....	2nd Lt....	R. F. D. No. 2, Shellsburg, Iowa
Raebone, Alexander Loudon.....	2nd Lt....	84 7th St., Ridgefield Park, N. J.
Shaw, Wm. Summer.....	2nd Lt....	Springvale, Maine
Spear, Maynard Lynn.....	2nd Lt....	501 E. Carlton St., Toledo, Iowa
Taylor, Clarence Leonard.....	2nd Lt....	Odebolt, Iowa
Voetberg, Henry Gezines.....	2nd Lt....	Traer, Iowa

Promotions

Armstrong, Herbert Leonard. . . To Major. 21 So. Main St., Bel Air, Md.

U. S. Civil Service Examination

The United States Civil Service Commission announces an open competitive examination for assistant parasitologist (trematodes) to fill vacancies in the Bureau of Animal Industry, Department of Agriculture, for duty in Washington, D. C., or in the field. The entrance salaries range from \$2,600 to \$3,200 a year.

Competitors will not be required to report for examination at any place, but will be rated on their education and experience, and on a thesis or published writing. Applicants must have been graduated from a college, university, medical college, or veterinary college of recognized standing. Their courses must have included biological sciences with at least one course in zoölogy. Suitable experience is also required.

Applications for examination must be on file with the Civil Service Commission at Washington, D. C., not later than August 21, 1931.

Full information may be obtained from the Secretary of the United States Civil Service Board of Examiners at the post office or customhouse in any city or from the United States Civil Service Commission, Washington, D. C.



STATE VETERINARY MEDICAL ASSOCIATION OF TEXAS

The twenty-first annual meeting of the State Veterinary Medical Association of Texas was held in conjunction with the ninth Short Course for Graduate Veterinarians at the A. & M. College, College Station, June 1-5, 1931. The program was one of the best ever arranged, and the attendance was one of the largest on record.

The meeting was opened with an address of welcome by Dean Mark Francis, who has lost none of his eloquence or appeal to the men of the profession, and each year the ties of love and loyalty to this brilliant brain and soul of a great school grow stronger and surer. Following the address of Dr. Francis, Dr. R. P. Marsteller introduced a number of nationally prominent persons who were to contribute to the program. These included Dr. C. A. Cary, of Auburn, Ala.; Dr. J. W. Connaway, Columbia, Mo.; Dr. Benjamin Schwartz and Dr. H. M. O'Rear, U. S. Bureau of Animal Industry, Washington, D. C.; Dr. Harry E. Kingman, Fort Collins, Colo.; Dr. L. A. Merillat, Chicago, Ill.; Dr. Dudley Jackson, physician and surgeon, of San Antonio, Texas; Dr. C. E. Salsbery and Dr. Ashe Lockhart, Kansas City, Mo. All of these men were contributors to the program. Aiding them were many men of Texas, including Drs. R. P. Marsteller, H. Schmidt, A. A. Lenert, A. E. Wharton and P. W. Burns, of the Texas A. & M. College; M. E. Gleason and U. E. Marney, San Antonio; W. G. Brock and R. A. Self, Dallas; T. O. Booth, Temple; and W. F. Hayes, of Farmersville.

On Monday evening, Dr. T. O. Booth, president of the Association, presided at the formal business and social session. Drs. J. W. Connaway, L. A. Merillat and C. A. Cary gave some interesting talks on impressions of veterinary conditions in Europe. Dr. Connaway also reviewed pioneer days spent with Dr. Francis. His reminiscences gave his hearers a renewed sense

of the value these men have been to the foundation of veterinary service and its organizations.

The Ladies' Auxiliary to the Association attended this meeting in a body. Mrs. W. R. Sanderson, President, declined to make a speech, stating that it was her privilege to listen. At this meeting Dr. Dudley Jackson, prominent physician and surgeon, who is also a graduate veterinarian, presented motion pictures on rabies. Dr. N. F. Williams, State Veterinarian, gave one of his usual interesting talks. Officers for the year were elected as follows: Dr. Frank Hecker, Houston, president; Dr. W. F. Hayes, Farmersville, first vice-president; Dr. Fred A. Murray, Austin, second vice-president; Dr. D. Pearce, Leonard, secretary-treasurer.

The Ladies' Auxiliary elected the following officers: President, Mrs. D. Pearce, Leonard; first vice-president, Mrs. H. O. Von Rosenberg, Hallettsville; second vice-president, Mrs. J. S. Grove, Fort Worth; secretary-treasurer, Mrs. U. E. Marney, San Antonio; corresponding secretary, Mrs. J. M. Farrell, Wichita Falls.

The men enjoyed a great barbecue feast and the ladies were the recipients of a round of entertainment.

D. PEARCE, *Secretary*.

OKLAHOMA VETERINARY MEDICAL ASSOCIATION

The seventeenth semi-annual meeting of the Oklahoma Veterinary Medical Association was held in conjunction with the second annual Short Course for Graduate Veterinarians, at the Oklahoma A. & M. College, Stillwater, June 15-17, 1931.

The Short Course included instruction on the following subjects: "Animal Nutrition" and "Feeds and Feeding," by Prof. Carl Thompson, Division of Animal Husbandry, Oklahoma A. & M. College; a comprehensive consideration of "Internal Parasites," including laboratory technic, by Dr. Benjamin Schwartz, Zoölogical Division, U. S. Bureau of Animal Industry, Washington, D. C.; "Diseases of Poultry," by Dr. C. A. Brandly, Kansas State College, Manhattan, Kans.; "Treatment of Bovine Digestive Disturbances," by Dr. E. J. Frick, also of Kansas State College; "Live Stock Judging," under the direction of Prof. W. L. Blizzard and Prof. Earl Weaver, both of the Oklahoma A. & M. College, Animal Husbandry Division; a discussion of "Poisonous Plants Found in the Southwest," by Prof. I. H. Featherly,

Oklahoma A. & M. College. "Diseases of Sheep," both in feeder lambs and breeding sheep, was covered by Dr. I. E. Newsom, of Colorado Agricultural College, Fort Collins. Dr. L. A. Merillat, of Chicago, Ill., gave an interesting and instructive talk on the problems of large-animal practice, in which he covered both the fields of surgery and of medicine in a very thorough manner.

One entire afternoon was devoted to a small-animal clinic. Dr. E. J. Frick, assisted by Drs. H. W. Ayers, W. C. McConnell and J. E. McPherson, gave an instructive demonstration of the proper methods of handling, examining and restraining the dog and other pet animals. A number of interesting cases were presented at the clinic, and the use of nembutal as an anesthetic was demonstrated. Dr. Frick also gave a very successful demonstration of epidural anesthesia, explaining the technic and the other indications for its use.

A short business session for the transaction of business was held on the evening of June 15. Among other business disposed of was the question of affiliation with the A. V. M. A. Resolutions were passed accepting in principle the plan of affiliation proposed by the A. V. M. A. Committee on Affiliation.

A delightful and well attended banquet was served in the College Cafe, on the campus, Dr. C. H. McElroy acting as toastmaster. The principal speakers of the evening were Dr. L. A. Merillat, whose subject was "The Veterinarian of the Past." He gave an interesting review of veterinary history, liberally sprinkled with amusing anecdotes, from the dim past to the present day, while Dr. C. C. Hisel, state veterinarian of Oklahoma, lifted the veil, peeked into the future, and portrayed the veterinarian as he will be, or should be, a generation hence, and Dr. L. H. Moe gave a brief outline of the plans which the College authorities have in mind for the Short Course in future years. A splendid program of entertainment consisting of several singing and dancing numbers, under the direction of the Fine Arts Department of the College, added greatly to the enjoyment of the evening.

The Association is to be congratulated on the interest and fine spirit of coöperation which the College is displaying in the Short Course idea. Under present plans, reasonable assurance is given that the annual Short Course for Graduate Veterinarians will be definitely and permanently established among the curricula of the A. & M. College.

With only sixty-four members and visitors registered, this was by no means a record meeting from the standpoint of attendance. Nevertheless, when measured by the program material, the unusually high quality of the speaking talent and the attentiveness and enthusiasm displayed, it can easily be numbered among the most successful and profitable meetings in the history of this Association.

C. H. FAUKS, *Secretary.*

VERMONT VETERINARY MEDICAL ASSOCIATION

At the annual meeting of the Vermont Veterinary Medical Association, held at the Hotel Van Ness, Burlington, June 20, 1931, the following officers were elected for the coming year: President, Dr. W. A. Hamilton, Danville; first vice-president, Dr. L. D. Perry, Saint Albans; second vice-president, Dr. N. H. Tenney, White River Junction; secretary-treasurer, Dr. G. N. Welch, Northfield.

There was only a short business session, owing to the fact that the New England Veterinary Medical Association was in session.

MICHIGAN STATE VETERINARY MEDICAL ASSOCIATION

The forty-ninth annual meeting of the Michigan State Veterinary Medical Association was held at Michigan State College, East Lansing, June 23-24, 1931.

The program was opened with an outdoor clinic, which was continued throughout the morning. Dr. W. A. Axby, of Harrison, Ohio, and Dr. J. F. Planz, of Akron, Ohio, were assisted by a number of Michigan veterinarians in putting on the clinic, which consisted of numerous operations on both small and large animals.

A business session was called to order by President John A. Schaefer, of Bangor, in the afternoon. Reports of officers were received and other routine business transacted. The Association approved a recommendation of the Board of Directors to appropriate the sum of \$250.00 toward the 1934 International Veterinary Congress.

The literary program was opened by Dr. J. F. Planz, of Akron, Ohio, who discussed small-animal problems. In his opening remarks, Dr. Planz emphasized the importance of veterinarians rendering real professional service to their clients. He then went on and related instances of things which had been done by

veterinarians in certain localities that tended to bring discredit upon the profession. Dr. Planz made an urgent plea for a more fraternal spirit among veterinarians, and at the same time he deplored in no uncertain terms the lack of coöperation displayed by some members of the profession. He then discussed a number of the more common conditions met in small-animal practice, and everyone present seemed to enjoy thoroughly the subject matter, as well as the manner in which Dr. Planz presented it.

Dr. L. C. Palmer, of Kalamazoo, presented a paper on ear-trimming. At the recent session of the Michigan Legislature a bill was introduced designed to prohibit the cropping of dogs' ears in Michigan. This bill was passed by the Senate, but it received rather rough treatment in the House. It was made the subject of considerable ridicule, and amendments to it, introduced by various members, from time to time, resulted in the bill losing considerable of its original form. It was very generally predicted that the bill would never come out of committee, but finally it was brought out, put to a vote and defeated. Some time later, without any warning, the bill was taken up again and passed. In its final form the cropping of dogs' ears was legalized when performed under anesthesia by a registered graduate veterinarian.

The meeting was adjourned at 3:30 and the members made a tour of the campus and inspected the College Experiment Station barns and stables. The various research projects were explained by those having this work in charge. A number of new barns have just recently been completed and these represent an investment of approximately \$250,000.00 and house several hundred head of animals valued at many thousands of dollars.

At 6:30 a banquet was served in the Union Building. Dr. Ward Giltner was master of ceremonies. The banquet was unusual, in that there were no speeches. Dr. Giltner asked a number of distinguished persons who were present merely to rise and bow. Following this ceremony, three reels of motion pictures were shown, depicting the 1928, 1929 and 1930 Grand National Steeplechase races held in England. These films proved to be intensely interesting, in view of the fact that sections of each film were shown as slow-moving pictures, and at certain other very critical points as still pictures. Thus, a wonderful opportunity was presented for studying Thoroughbred horses in motion.

Wednesday morning, the program was opened by Dr. G. A. Sturm, of Bad Axe, who presented a very interesting paper on bovine mastitis which brought out a rather lengthy discussion, and which had to be terminated by the Chair.

Dr. W. A. Axby, of Harrison, Ohio, then read a paper on large-animal problems. A large part of this paper was devoted to the author's experiences in handling Bang's disease. Dr. Axby was the recipient of many compliments at the conclusion of his paper, and several veterinarians stated that it was the best paper on the subject that they had ever heard from a practitioner.

At the afternoon session, Dr. C. H. Haasjes, of Shelby, discussed "Diseases of the Bovine Feet." This subject was presented in a very interesting fashion and Dr. Haasjes complied with numerous requests and demonstrated his operation for amputation of the toe.

Dr. A. H. DeGroot, of Dundee, discussed "The Hatchery Business and Baby Chick Diseases as I Have Handled Them." Dr. DeGroot is located in a territory where the hatchery business is conducted on a rather large scale, and his experiences in connection with diseases of baby chicks proved to be very interesting.

Dr. H. J. Stafseth, of Michigan State College, discussed "Diseases of the Reproductive Organs of Poultry." Although Dr. Stafseth was limited for time, he was able to present this rather large subject in his usual interesting fashion.

The concluding number on the program was a discussion of "Affiliation with the A. V. M. A.," presented by Dr. H. Preston Hoskins, secretary of the A. V. M. A. He briefly reported the progress which has been made with this proposal and enumerated several of the difficulties which will have to be overcome before affiliation is an accomplished fact. Dr. Hoskins explained what he considered would be the greatest advantages to be gained by having state, provincial and territorial associations affiliated with the national body.

Reports of standing and special committees were then presented. The election of officers for the ensuing year resulted as follows: President, Dr. E. B. Cavell, Northville; first vice-president, Dr. M. J. Smead, Rochester; second vice-president, Dr. E. T. Hallman, East Lansing; third vice-president, Dr. F. K. Hansen, Marquette; secretary-treasurer, Dr. E. K. Sales, East Lansing; member of the Board of Directors, to serve six years, Dr. F. M. Blatchford, Brighton.

The President was authorized to appoint a special committee to study plans for celebrating the fiftieth anniversary of the organization of the Michigan State Veterinary Medical Association, in 1933. He was also authorized to appoint a delegate to represent the Association at the Kansas City meeting of the A. V. M. A.

During the meeting the wives of the veterinarians got together and completed the organization of the Ladies' Auxiliary, which was informally organized one year ago.

EDW. K. SALES, *Secretary-Treasurer.*

NORTH CAROLINA STATE VETERINARY MEDICAL ASSOCIATION

The thirtieth annual meeting of the North Carolina State Veterinary Medical Association was held at Winston-Salem, June 24-25, 1931, with Dr. W. A. Hornaday, of Greensboro, as the presiding officer. In his presidential address, Dr. Hornaday reviewed some of the history of the Association during the three decades of its existence, mentioning that Dr. Adam Fisher, of Charlotte, is the only charter member remaining on the roll of the Association. Dr. Hornaday directed attention to the fact that the Association has not been making contacts with other groups, as it should, namely with the medical fraternity, the State University and other schools, and the extension forces of the State.

Dr. John F. DeVine, of Goshen, N. Y., reviewed the anatomy of the genitalia of the mare and cow, stressing the fact that there is a big difference in the location of the ovaries in the two species. In the mare these organs are located well anteriorly, while in the cow they lie posteriorly, even in the pelvis. At the clinic, in the afternoon of the first day, Dr. DeVine examined a number of cases of sterility in the cow and gave valuable explanations in each case.

A prominent feature of the meeting was the talk on Thursday morning, by Dr. E. M. Nighbert, of the Zoölogical Division, U. S. Bureau of Animal Industry, Washington, D. C. Dr. Nighbert reviewed the work he had done at Moultrie, Ga., on the kidney worm of swine, stating that in the life cycle of this parasite much damage is done to the liver, and that the big thing to be done in the matter of control consists of sanitation and the rotation of pastures.

Other papers presented at the meeting included:

- "Meat and Milk Inspection," by Dr. A. C. Jones, High Point.
- "John's Disease," by Dr. W. C. Dendinger, U. S. B. A. I., Raleigh.
- "Home-Grown Feeds for Live Stock," by Dr. C. D. Grinnells, Raleigh.
- "The Advent of a New Member to the Live Stock Industry in North Carolina—The Domestic Rabbit," by Dr. H. C. Rea, Charlotte.
- "Surgery in Small Animals," by Dr. G. C. Monroe, Greensboro.

The president of the North Carolina State Board of Health, Dr. J. T. Burrus, of High Point, a leading surgeon of the State, gave an intensely interesting talk, entitled, "The Veterinary Profession in Relation to Public Health." Dr. Burrus stated that veterinarians have a work to do that can be done by no other men, and he urged the Association to bestir itself and do the work that is necessary to be done.

Officers elected for the ensuing year are Dr. J. P. Spoon, Burlington, president; Dr. P. C. McLain, Gastonia, first vice-president; Dr. W. H. Kern, Winston-Salem, second vice-president and Dr. J. Howard Brown, Rich Square, secretary-treasurer.

It was decided to hold the 1932 meeting at Henderson, the home of Dr. A. C. Yow.

J. HOWARD BROWN, *Secretary-Treasurer.*

SOUTHEAST KANSAS VETERINARY MEDICAL SOCIETY

Veterinarians located in fifteen counties in the southeastern part of Kansas have organized the Southeast Kansas Veterinary Medical Society. Officers have been elected as follows: Dr. Roy L. McConnell, Coffeyville, president; Dr. J. C. Green, Bronson, vice-president; Dr. L. F. Barthelme, Parsons, secretary. A committee has been appointed to draw up a constitution and by-laws which will be presented for adoption at the next meeting, to be held in September. It is planned to hold four meetings of the Society, during each year.

THE NORTH DAKOTA VETERINARY MEDICAL ASSOCIATION

The twenty-ninth annual meeting of the North Dakota Veterinary Medical Association was held at the Agricultural College, Fargo, July 6-7, 1931. The attendance was up to expectations, while the interest shown in the program contributed to make the meeting an unusually successful one. The meeting followed

those held in Wisconsin and Minnesota, and several of the speakers appeared at the three meetings.

The opening session was featured with a discussion of "Some Aspects of Swine Diseases and Swine Practice," by Dr. A. H. Quin, Jr., of Des Moines, Iowa. Numerous useful hints and practical suggestions were presented for handling conditions encountered in swine practice.

Dr. Herbert Lothe, of Waukesha, Wis., presented a paper on "The Diseases of Breeding Cattle," which was a scholarly analysis of the difficulties encountered in maintaining the breeding efficiency of cattle. The discussion developed some useful comments on the practical control of Bang's disease and the associated problems.

Dr. D. H. Udall, of the New York State Veterinary College, spoke on "The Prevention of the Diseases of the Newborn." The methods which, in his experience, have been useful in the prevention of calf scours, and the analysis of the unfavorable conditions which often result in the loss of these young animals, were of especial interest.

Dr. Maurice C. Hall, president of the American Veterinary Medical Association, discussed his proposed plan which will be offered at the Kansas City meeting. It was a far-sighted analysis of the problems of the profession and included many suggestions for improving the status of veterinarians.

Dr. Hall spoke again, with "Parasites of Sheep and Swine" as the subject. The increase in the sheep and swine population of North Dakota during recent years made the topic of especial interest.

Prof. F. W. Christensen, of the North Dakota Agricultural College, presented a paper on "Our Nutrition Problems." He called attention particularly to the need of an adequate protein intake and the role that phosphorus and calcium play in nutrition. This topic was quite opportune, because of the unusual prevalence of nutritional deficiencies last winter. The program was concluded with an exceedingly interesting address on "The Diagnosis and Control of Mastitis," by Dr. D. H. Udall. His demonstration of the methods of diagnosis was unusually interesting.

The following officers were elected for the ensuing year: President, Dr. E. V. Lagerberg, Tioga; vice-president, Dr. W. D. Odou, Hettinger; secretary-treasurer, Dr. Lee M. Roderick, State College Station, Fargo.

LEE M. RODERICK, *Secretary.*

VETERINARY MEDICAL ASSOCIATION OF NEW JERSEY

The forty-seventh semi-annual meeting of the Veterinary Medical Association of New Jersey was held at Asbury Park, July 9-10, 1931. Fifty veterinarians were in attendance.

Dr. F. R. Beaudette, Poultry Pathologist at the New Jersey State College of Agriculture, New Brunswick, gave an excellent discussion of "Some Factors Involved in the Prevention of Poultry Diseases." Dr. Beaudette spoke of some of the newer disorders caused by nutritional imbalances, such as so-called "hock disease" and "crazy disease," as well as the better known infectious and parasitic diseases. He stressed the fact that some of the newer nutritional diseases are brought on by the modern intensive systems of poultry-raising where large numbers of fowl are raised in restricted quarters under very unnatural conditions. It was also pointed out that the increasing trend of poultry associations to hold poultry shows and egg-laying contests is responsible for the wide dissemination of poultry diseases. Infectious bronchitis, one of the important virus diseases, which appears on some farms year after year, is now known to be disseminated by carriers which may harbor the infection for as long as sixteen months in the upper respiratory tract.

Dr. J. F. Shigley, of the Pennsylvania State College, State College, Pa., presented a paper on "Trends in Scientific Thought Relative to Sterility." Dr. Shigley gave a comprehensive review of the modern literature on the subject, calling attention particularly to the part which vitamins and endocrine glands may play. He also stressed the point that veterinarians should be more exact and careful in the information and opinions given when called to treat cases of sterility; generalizations do not satisfy the live stock owner and are to be avoided.

Dr. E. B. Ackerman, of Huntington, L. I., spoke on the subject of "Lameness in the Horse." His discussion was comprehensive and instructive. He not only presented an academic classification of lamenesses but also drew on his own wide experience to point out the essentials for proper diagnosis, and the need for care in establishing as accurately as possible the true locus of the ailment.

Dr. Richard A. Kern, Assistant Professor of Medicine at the University of Pennsylvania, gave a most interesting discussion of "Human Aspects of Bang Disease." Dr. Kern preceded his

talk with a concise history of veterinary education, pointing out that the veterinary profession has made marked progress for a profession comparatively young insofar as veterinary schools in this country are concerned. He also bespoke a closer relationship between human and veterinary medicine, suggesting as a reason for past shortcomings in this respect the fact that, with one exception, the veterinary schools in this country are associated with agricultural schools and, with three exceptions, are not on the same campus with medical schools. Dr. Kern's discussion of undulant fever was comprehensive and the best that has been heard by the writer. A talk on "Small-Animal Practice" was given by Dr. Joseph DeVita, of New Haven, Connecticut. Dr. DeVita's remarks were interesting and stimulating, in that he follows somewhat unusual methods of practice in his small-animal work. He maintains no hospital, has all patients brought to his office in order to facilitate special examinations, and seldom makes calls. Dr. DeVita emphasized his belief that many pet animals, especially dogs, suffer from infections very similar to those seen in the human family, especially infections involving the respiratory tract.

Following a talk by Dr. Eichhorn, chairman of the American Veterinary Medical Association Committee on International Veterinary Congress, the Association took action pledging a minimum of \$300.00 to help defray expenses of the Congress.

The next meeting of the Association will be held in Jersey City, January 14-15, 1932.

J. G. HARDENBERGH, *Secretary.*

WESTERN NEW YORK VETERINARY MEDICAL ASSOCIATION

The eighteenth semi-annual meeting of the Western New York Veterinary Medical Association was held at Webster, N. Y., July 16, 1931, on the beautiful grounds of Willow Brook Farm, the country place of Dr. F. L. Stein, of Rochester, N. Y. A basket lunch was served at noon, after which a short clinic was held, followed by a business session.

At 6 o'clock, dinner was served to members and guests, to the number of 107, at the Blarney Stone Inn, in West Webster. The dinner was interspersed with a fine musical program furnished by the R. J. Strassenburgh Company, of Rochester. This entertainment was in the form of a surprise and this delightful courtesy was heartily enjoyed by all.

The evening session was devoted to a program of addresses and papers on interesting topics. Dr. J. L. Wilder, of Akron, rendered a report on the meeting of the New York State Veterinary Medical Society, recently held at Syracuse. Dr. C. M. Carpenter, of Rochester, discussed the relations of veterinary medicine to diseases of man. Dr. J. F. DeVine, of Goshen, discussed breeding problems of equines and bovines. Dr. E. G. Baxter, of Webster, gave a paper on "Rabbits and Their Importance to the Veterinarian." Mr. Emmett R. Gauhn, chief of the Department of Sanitation, Rochester, presented a paper, entitled, "The Increasing Importance of the Veterinarian in Milk Control Programs."

F. F. FEHR, *Secretary-Treasurer.*

NORTHWESTERN OHIO VETERINARY MEDICAL ASSOCIATION

The summer meeting of the Northwestern Ohio Veterinary Medical Association was held at the Maumee River Yacht Club, Toledo, July 18, 1931. Although the weather was uncomfortably warm, it did not prevent about one hundred veterinarians from attending. About one-fourth of them were accompanied by their wives. Dr. O. V. Brumley, of Columbus, presided.

The program was opened by Dr. George H. Pierce, State Veterinarian of Ohio, who addressed the meeting on "The Program and Scope of the Control of Bang's Disease in Ohio." Dr. Pierce outlined the plans which are being launched for the control of Bang's disease in the Buckeye State. He was followed by Dr. H. G. Bond, of the Ohio State Department of Animal Industry, who spoke on "Some Problems in the Bang's Disease Control Program as Adopted by the State Department of Animal Industry." Dr. Bond went into considerable detail in explaining some of the problems which have been encountered in the work thus far undertaken.

Dr. A. J. DeFossett, Inspector in Charge, U. S. Bureau of Animal Industry, spoke on "The Program for the Control and Eradication of Avian Tuberculosis in Ohio." He presented statistics and a map indicating the extent of avian tuberculosis in Ohio as revealed by a survey made throughout the State as well as by postmortem records on hogs slaughtered at Cleveland. Dr. DeFossett placed special emphasis on the interest which is being shown in the plans for eradicating avian tuberculosis by

those engaged in the poultry packing industry. The packers apparently are very anxious to have the disease eradicated before the general public comes to appreciate the extent of tuberculosis among poultry.

Following the adjournment of the morning session, a chicken dinner was served in the dining-room of the Yacht Club. The after-dinner speaker was Mr. Roger Conant, Director of Education, Toledo Zoölogical Society. He explained the educational program which is being carried on under the auspices of the Toledo Zoölogical Society, and related many interesting anecdotes in connection with his work. The Toledo Zoo is regarded as one of the educational institutions of the city, rather than as merely a place of amusement. The collection of animals in the Toledo Zoo is now one of the largest in the country, and no small part of the success of the institution is undoubtedly due to the veterinary supervision of the animals, given by Dr. Reuben Hilty of Toledo.

Following the dinner, Mr. Conant conducted a party of about twenty-five through the Zoo and explained many of the interesting features to be found there.

At the afternoon session of the meeting, Dr. A. F. Schalk, of Ohio State University, discussed "Fowl-Pox." He explained the relation of the disease to the poultry industry and then outlined the plan that has been proposed for controlling the disease in Ohio. Dr. Schalk exhibited a number of chickens that had been vaccinated against fowl-pox, a number of days previously, some by the stick method, and others by the follicle method. The veterinarians present were enabled to examine these fowls closely and note the vaccination lesions.

COMMENCEMENT

The commencement exercises of the State College of Washington were held June 1, 1931. Fifteen men received degrees in veterinary medicine, as follows:

Dan Adler	Glenn Kenaston
Carl Claire	Primitivo Leano
Roy Conner	Milton C. Levy
Bernard Copple	Harold McCorkle
Leslie Ellis	Gene McCune
Fred Harris	Howard Slack
Edward Joneschild	Richard Tompkins

Neil Wilson

According to information given by Dean Wegner, most of the graduates have obtained positions or will enter into private practice.

NECROLOGY



SOFUS B. NELSON

Dr. Sofus B. Nelson, of Spokane, Wash., died June 4, 1931. He had been in poor health for almost a year.

Born in Veile, Denmark, December 21, 1867, Dr. Nelson came to the United States as a young man. He located in Iowa and later entered Iowa State College, where he studied veterinary medicine. Following his graduation in 1889, he returned to Denmark and continued his scientific studies in the University of Copenhagen. In the early nineties, he entered practice in the city of Spokane.

In 1895, the Washington State Legislature decreed that the State College of Washington should maintain a professor of veterinary science and that he should be ex-officio State Veterinarian. Dr. Nelson was appointed to this dual position by the Board of Regents, and he immediately provided for courses in veterinary science, in conjunction with the courses in animal husbandry offered by the Department of Agriculture.

About 1900, the courses in veterinary science were reorganized by Dr. Nelson and a new course offered, leading to a degree. The first class, consisting of two members, was graduated in 1902, from the School (now College) of Veterinary Medicine. In 1915, the Legislature separated the office of State Veterinarian from its connection with the State College, and Dr. Nelson remained as Dean of the School of Veterinary Science. Two years later, the departments of the College were reorganized and the School became the College of Veterinary Science.

In 1919, Dr. Nelson was called to the position of Dean and Director of the Extension Service of the State of Washington, a field with which he was thoroughly familiar as a result of his long experience as an extension lecturer. He continued in this important work until February, 1930. Since that time, he had been identified with the Mutual Life Insurance Company of New York.

Dr. Nelson joined the A. V. M. A. in 1890 and was among the twenty oldest members of the organization when he died. He served the Association as an officer, or in some other capacity, almost continuously for twenty-five years and was made a Fellow in 1915. From 1891 to 1902, and from 1906 to 1909, he served as Resident Secretary for Washington. In 1898, he was elected a vice-president. He served as a member of the Committee on Resolutions (1901-02), Intelligence and Education (1909-10), Finance (1910-11), Executive (1911-12) and Adversitment of Veterinary Remedies (1912-13).

His other affiliations during this period indicate the part played by Dr. Nelson in the interests of the veterinary profession and the live stock industry of the state of Washington. He was a member of the Washington State Board of Health from 1895 to 1913 and served one term as secretary (1901-02). He was a member of the Washington State Board of Veterinary Medical Examiners from 1907 to 1913. He was a member of the Washington State Veterinary Medical Association and served as secretary for a number of years. He was secretary of the Washington State Live Stock Sanitary Association from 1906-1913.

Dr. Nelson is survived by his widow (née Jettchen Uhden).

JAMES GOODERHAM FISH

Dr. James G. Fish, of Tallahassee, Florida, died May 23, 1931, at the Monroe Memorial Hospital, Ocala, Florida, as the result of an automobile accident five days previously.

Born October 21, 1868, at Streetsville, Ontario, Dr. Fish studied veterinary medicine at the Chicago Veterinary College. Following his graduation, in 1892, he engaged in general practice for about a year and then entered the service of the U. S. Bureau of Animal Industry. He was assigned to meat inspection and later field inspection. In 1917 he was placed in charge of tuberculosis eradication in Florida and in 1924 hog cholera control was placed under his direction. He was on official business when the fatal accident occurred.

Dr. Fish was a member of the Florida State Veterinary Medical Association, the U. S. Live Stock Sanitary Association, the National Association of B. A. I. Veterinarians and the Masonic order. He is survived by his widow, one daughter and two sons, Drs. C. C. Fish (O. S. U. '22) and J. G. Fish, Jr., (O. S. U. '21), both veterinarians.

HAROLD E. McDONALD

Dr. Harold E. McDonald, of Mountain Grove, Mo., died March 5, 1931, aged 29 years. Death was due to tuberculosis and complications, the affliction dating back almost five years. Dr. McDonald was a graduate of the Saint Joseph Veterinary College, class of 1922.

R. A. McBRAYER

Dr. R. A. McBrayer, formerly of Quincy, Florida, died April 17, 1931, in a Dothan, Alabama, hospital. He was a graduate of the United States College of Veterinary Surgeons, class of 1918, and held Florida License No. 21.

WILLIAM STRATMAN

Dr. William Stratman, of Danville, Ill., aged 57, died at his home, May 16, 1931, after an illness of more than a year, following a stroke of paralysis. He was a graduate of the Chicago Veterinary College, class of 1909. Surviving him are his widow, two daughters and one son.

JOHN L. COX

Dr. John L. Cox, of Norton, Virginia, was killed June 28, 1931. He was a deputy game warden and was shot while in his automobile on the Guest River highway, three miles from Norton, by Ted Carter, a young miner, who pleaded self-defense when placed under arrest.

A native of Scott County, Virginia, Dr. Cox was a graduate of the Indiana Veterinary College, class of 1921, and had practiced at Norton since graduation.

GEORGE PARKER CURRY

Dr. George P. Curry, of Coshocton, Ohio, died at his home, July 3, 1931, following a brief illness caused by articular rheumatism. He was born in East Palestine, Ohio, June 12, 1865, and was a graduate of Mount Hope Academy. In 1891, he was graduated in pharmacy from Ohio Northern University. He attended the McKillip Veterinary College but did not finish the regular course. He was registered in Ohio as a non-graduate practitioner and had practiced in Coshocton since 1913.

Dr. Curry is survived by twin sons, a stepson and one brother.

JASPER C. VANCE

Dr. J. C. Vance, of Indianapolis, Ind., died at his home, July 5, 1931, as the result of a sunstroke two days before.

Born in Darke County, Ohio, January 11, 1880, he lived in Anderson, Shelbyville and Greenfield, Indiana, before locating in Indianapolis sixteen years ago. Dr. Vance attended the Anderson (Ind.) High School and the Indiana Veterinary College. He was graduated from the latter in 1922 and engaged in general practice in Indianapolis.

Dr. Vance joined the A. V. M. A. in 1924. He was a member of the Indiana Veterinary Medical Association. Other affiliations included the Knights of Columbus and the B. P. O. E. He is survived by his widow, one son, three daughters and one sister. Burial was at Anderson, Ind.

WILLIAM E. CLEMONS

Dr. William E. Clemons, of Granville, Ohio, died at his home, July 7, 1931, after an illness of two weeks.

A lifelong resident of Granville, having been born there, February 6, 1863, Dr. Clemons was one of the town's prominent citizens. He had served on the Public Board of Affairs, was a former clerk of the township trustees and, at the time of his death, was a member of the Granville Village Council.

Dr. Clemons attended Denison University before going to the Ontario Veterinary College. Following his graduation in 1900, he returned to Granville and practiced there until his fatal illness. He is survived by his widow and one sister.

Dr. Clemons was a member of the Ohio State Veterinary Medical Association.

Our sympathy goes out to Dr. J. V. Lacroix, of Evanston, Ill., in the death of his widowed mother at her home in Hiawatha, Kans., recently; to Dr. Frederick P. Ruhl, of Milford, Del., in the death of his wife, June 22, 1931, after an illness of a month; to Dr. Horace Bradley, of Clayton, Mo., in the death of his wife, May 20, 1931; and to Dr. E. B. Ward, of Jefferson City, Mo., and Dr. H. C. Ward, of Fulton, Mo., in the death of their father, at Perry, Mo., July 6, 1931.

PERSONALS

MARRIAGES

Dr. H. H. McIntyre (M. S. C. '15), of Rahway, N. J., to Miss Jane B. Allen, of New York City, February 15, 1931, at New York City.

Dr. Roy L. McConnell (K. S. C. '28), of Coffeyville, Kans., to Miss Margery Carpenter, of Pittsburg, Kans., May 6, 1931, at Pittsburg, Kans.

Dr. Lysle J. Lanphere (Colo. '27), of Kimball, Nebr., to Miss Anita Schlicting, of Omaha, Nebr., May 29, 1931, at Fort Collins, Colo.

Dr. James W. McClure (McK. '13), of Winchester, Ky., to Miss Mabel Snider, of Brooksville, Ky., on July 4, 1931, at Bardstown, Ky.

Dr. Clarke Hedley (Cin. '07), of Newark, N. J., to Miss Elizabeth Jane Jones, of Southbank, Yorkshire, England, July 7, 1931, at New York City.

BIRTHS

To Dr. and Mrs. W. R. Scott, of Maplewood, Mo., a son, Donald Magee, February 4, 1931.

To Dr. and Mrs. Bernard R. Mann, of Philadelphia, Pa., a son, Alan Marcus, March 27, 1931.

To Dr. and Mrs. John L. Myers, of Menominee, Mich., a daughter Mary Joann, March 27, 1931.

To Dr. and Mrs. Harry S. Johnson, of Central City, Nebr., a daughter, Donna Lou, May 11, 1931.

To Dr. and Mrs. Horace A. Gould, of Hollywood, Calif., a son, Charles Alden, May 14, 1931.

PERSONALS

Dr. Bryan F. Lott (Iowa '31) is located at McCook, Nebr.

Dr. R. L. Schmidt (Ont. '31) has located at Monticello, Wis.

Dr. V. S. Jacobi (McK. '18) has removed from Greenville, Ill., to Bunker Hill, Ill.

Dr. John B. Cheshire (K. S. C. '31) has located at Hopkins, Mo., for general practice.

Dr. F. E. Reddert (Colo. '28), formerly of Fresno, Calif., has removed to Arboles, Colo.

Dr. W. T. Brinker (O. S. U. '30) has removed from Leetonia, Ohio, to Columbiana, Ohio.

Dr. Gerald B. Merrick (O. S. U. '31) has decided upon Shannon, Ill., for starting a practice.

Dr. Bernard V. Aldredson (Mich. '31) has started his professional career at Grand Ledge, Mich.

Dr. Walter C. Ferrall (O. S. U. '31) has located at Canton, Ohio. Address: 320 Fourth St., N. E.

Dr. J. G. Catlett (U. S. C. V. S. '16), of Miami, Fla., is president of the Magic City Kennel Club.

Dr. Cameron W. Argue (O. S. U. '30) has opened a small-animal hospital at 51 Central Ave., Orange, N. J.

Dr. C. H. Clark (Ont. '90) has been reappointed State Veterinarian of Michigan, by Governor Brucker.

Dr. R. D. Wenger (O. S. U. '31) is located at Morgan's Dog & Cat Hospital, 910 W. Lake St., Minneapolis, Minn.

Dr. John J. Thomas (U. P. '17), formerly of Clarks Summit, Pa., is now located at 301 Swan St., Paxtang, Pa.

Dr. Henry Schwermann (Iowa. '31) has selected New Ulm, Minn., as an inviting location for a general practice.

Dr. E. D. Johnston (K. S. C. '31) has selected Pomona, Kans., as a promising locality in which to develop a practice.

Dr. C. C. Steibing (U. S. C. V. S. '23) has removed from Baltimore, Md., to Harrisburg, Pa. Address: 1939 Lenox St.

Dr. Robert H. Morrison (Wash. '29) reports a change of address from Seattle, Wash., to 767 Ala Moana, Honolulu, Hawaii.

Dr. Stanley Martinkewz (Mich. '31) has located at Yale, Mich., and taken over the practice of the late Dr. J. B. Stevens.

Dr. R. H. Fish (Mich. '31) has opened an office at 203 W. Michigan Ave., Saline, Mich. He will engage in general practice.

Dr. Rex Taylor (Wash. '30) has removed from San Francisco, Calif., to Seattle, Wash. Address: 8821 Woodland Park Ave.

Dr. L. P. Bailey (O. S. U. '31), of South Charleston, Ohio, has taken over the practice of the late Dr. H. W. Feldwisch, at Piqua, Ohio.

Dr. Andrew L. McBride (K. S. C. '31), formerly of Manhattan, Kans., has removed to Leavenworth, Kans. Address: 612 Delaware St.

Dr. James R. Peters (O. S. U. '31), of Fremont, Ohio, has been appointed to a position at the Ohio State Laboratories, at Reynoldsburg, Ohio.

Dr. J. E. Severin (O. S. U. '16), formerly of Decatur, Ga., has removed to Atlanta, Ga., and opened a small-animal hospital at 357 Edgewood Ave. N. E.

Dr. Lawrence O. Mott (K. S. C. '29), who has been at the Veterinary Hospital, Kansas State College, during the past year, has located in Astoria, Ore.

Dr. E. G. LeDonne (Colo. '23), formerly of Glenwood Springs, Colo. is now, connected with the Fresno Veterinary Hospital, 1212 Belmont Ave., Fresno, Calif.

Dr. Earl J. Starbuck (O. S. U. '14), of Port William, Ohio, is reported to be recovering from an emergency operation for appendicitis performed the first week in July.

Dr. C. E. Palmer (Cin. '14), of Shelbyville, Ky., has been appointed a member of the Kentucky State Board of Veterinary Medical Examiners, by Governor Sampson.

Dr. N. S. Mayo (Chi. '89), of Highland Park, Ill., has been appointed a member of the Medical Arts Committee of the Chicago World's Fair, representing the veterinary profession.

Dr. W. N. Armstrong (Ont. '94), of Concord, Mich., spent two weeks in camp at Grayling, Mich., in July, with the 2nd Battalion of the 119th Field Artillery, Michigan National Guard.

Dr. Robert Learmonth (Mich. '25), formerly at the Rhode Island Agricultural Experiment Station, is now in Denver, Colo., and is planning on taking a year of graduate work for an M. S. degree.

Dr. C. H. Reading (Mich. '27), who recently completed work for the degree Master of Science, at Michigan State College, has located at Decatur, Mich. He formerly practiced at Hopkins, Mich.

Dr. T. J. Reinhard (Gr. Rap. '13), of Nevada, Iowa, has removed to Green Bay, Wis., where he will be associated with Dr. F. S. Miller (Chi. '11), in conducting a small-animal hospital at 412 N Adams St.

Dr. C. W. McCampbell (K. S. C. '10), head of the Department of Animal Husbandry, Kansas State College, has been appointed consulting specialist in animal husbandry, in the U. S. Bureau of Animal Industry.

Dr. A. M. McCapes (Colo. '27), formerly at the Oregon Agricultural College Experiment Station, Corvallis, has accepted a position in the Department of Veterinary Science, of the University of Missouri, at Columbia.

Dr. Arcadio C. Gonzaga (Phil. '26), of the University of Philippines, Laguna, P. I., recently arrived in the United States. For a while he will pursue studies in the Department of Veterinary Physiology, at Cornell University.

Dr. J. P. Delaplane (O. S. U. '29), who has been at Ohio State University, the past year, has accepted a position as assistant in animal breeding and pathology at the Rhode Island Agricultural Experiment Station, Kingston, R. I.

Dr. J. F. DeVine (Amer. '98), of Goshen, N. Y., addressed the Section on Public Health, Hygiene and Sanitation of the Medical Society of the State of New York, at Syracuse, June 3, 1931, on the subject, "Veterinary Aspects of Undulant Fever."

Dr. Russell McNellis (Iowa '28), who is employed as Division Veterinarian for the United Fruit Company, in Banes, Cuba, spent his annual vacation, this summer, in New York City and the New England States. Dr. and Mrs. McNellis sailed from New York, July 3, for Santiago de Cuba.

Dr. E. R. Steel (Corn. '14), of Kansas City, Mo., is convalescing from an illness that kept him in bed for six weeks. Earlier in the year he had an attack of flu and this was followed by high blood pressure and cardiac derangement. Dr. Steel plans to be on the job, in charge of registration, at the convention.